British Society for the Study of Orthodontics.

1931

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TRANSACTIONS

OF THE

British Society for the Study of Orthodontics

1931

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1932 Officers and Councillors are given on page 78.

NOTICE.

The attention of members is drawn to the change of headquarters from 11, Chandos Street, to The Institute of Hygiene, 28, Portland Place, W.1. All communications should be addressed to the Hon. Secretary, 270, *Earl's Court Road, S.W.*5, or 3, Walpole Road, Surbiton, Surrey, or to any other officer particularly concerned.

British Society for Study of Orthodontics

[*January* 1*st*, 1932.

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INDEX

A. T. PITTS.
Some Observations on Malocclusion of the Deciduous Dentition 7
Valedictory Address 93
ROBERT CUTLER.
Post-Normal Occlusion as a Manifestation of the Lymphatic State 23
MRS. LILIAN LINDSAY.
Changes in the Bone of the Mandible and the Temporo-Mandibular Joint, incident to the Application of Orthodontic Appliances—Suggestion as to the Etiology of Inferior Protrusion 35
F. BOCQUET BULL.
A Case of Immediate Torsion Involving Secondary Treatment 50
Technique of Cast Cap Making for Anchorage of Fixed Appliances 52
Stainless Steel Soldering 52
G. F. CALE MATTHEWS.
Tools, etc., I use in Orthodontic Work 53
DR. E. W. FISH.
Dr. B. Gottlieb's Work on Traumatic Occlusion 53
NORMAN GRAY.
Bands 54
H. G. WATKIN.
Points in Dentocoll Technique for Orthodontic Work ... 55
H. C. VISICK.
Retaining Removable Appliances 55
BERTRAM SAMUEL.
Some Observations on Orthodontic Diagnosis 57
D. S. HAYTON-WILLIAMS.
Two Cases Treated with the Ribbon Arch 63
C. L. ENDICOTT.
An Unusual Case of Inferior Protrusion (Angle Class III) 67
J. LEWIN PAYNE.
Deficiency of Teeth 69
F. A. WALKER.
An Approach to the Treatment of Adult Dento-Facial Deformities 74
O. N. CATCHPOLE.
An Extra Feature when Deciding Treatment 76
SIR NORMAN BENNETT.
The Psychology of Orthodontic Treatment 78
REPORTS OF OFFICERS 92
BALANCE SHEET 95

A MEETING of the Society was held on Monday, January 19th, 1931, the President. Mr. A. T. PITTS, D.S.O., in the chair.

The PRESIDENT delivered his inaugural address.

A MEETING of the Society was held at 11, Chandos Street, Cavendish Square, on Monday, February 2nd, 1931, the President, Mr. A. T. PITTS, occupying the chair.

The PRESIDENT stated that after the May meeting the Society would no longer be meeting at Chandos Street. The meetings would be held at the premises of the Institute of Hygiene, in Portland Place. Full intimation of the alteration would be made in subsequent notices. He also drew attention to the fact that at the forthcoming International Dental Congress, to be held in Paris in August of this year, there would be a section devoted to orthodontics, and Dr. Quintero, who was in charge of that section, was very anxious that this country should be represented. He hoped that members who could make contributions to the orthodontic section would bear that in mind.

Mr. Laughton and Mr. Catchpole, new members, were welcomed by the President and signed the Obligation Book.

Mr. ROBERT CUTLER read a paper :

POST-NORMAL OCCLUSION AS A MANIFESTATION OF THE "LYMPHATIC STATE."

A MEETING was held at 11, Chandos Street, on March 2nd, 1931, the President, Mr. A. T. PITTS, in the chair.

The SECRETARY read the minutes of the last meeting, which were adopted unanimously.

VISITORS.

The PRESIDENT announced that several visitors were present. He drew particular attention to the presence of Madame Strömgren, a dentist from Copenhagen. Madame Strömgren, he said, shared with Mrs. R. Lindsay the distinction of being one of the historians of dentistry. He hoped that she and other visitors who were present would regard themselves as members for that evening and take part in the discussion.

Mrs. LINDSAY read a paper :—

CHANGES IN THE BONE OF THE MANDIBLE AND THE TEMPORO-MANDIBULAR JOINT INCIDENT TO THE APPLICATION OF ORTHODONTIC APPLIANCES. SUGGESTION AS TO THE ETIOLOGY OF INFERIOR PROTUSION.

SOME OBSERVATIONS ON MALOCCLUSION OF THE DECIDUOUS DENTITION.*

By A. T. Pitts, D.S.O., M.R.C.S., L.R.C.P., L.D.S.

I am conscious of some temerity in choosing for my presidential address the subject of malocclusion of the deciduous dentition, and thus following at a short interval, Mr. Northcroft who has made this subject peculiarly his own. Yet, there is still so much to be learned about the beginnings of malocclusion that I may be pardoned for offering you some discursive reflections on this aspect of orthodontics, with the intention of revealing some of the gaps in our knowledge rather than of providing solid information.

When I qualified, and even after I had held the post of house-surgeon in the Children's Department of the Royal Dental Hospital, I was profoundly ignorant of the existence of malocclusion of the deciduous dentition. I do not think that I was more inattentive than my fellow-students, but I cannot recall any teaching which suggested that the many irregularities of the permanent teeth might have their precursors in the milk dentition. Apart from caries the deciduous teeth received little attention, and though it might have been admitted that occasionally the milk teeth could show variations from the usual arrangement, yet since any orthodontic treatment of these teeth would have been thought by most practitioners to be absurd, the study of the deciduous dentition in any detail was looked upon as unnecessary.

Even to-day this attitude is not unknown, and the deciduous dentition still awaits detailed study. Perhaps the clue to this curious neglect lies in the fact that any investigation of the irregularities of the deciduous teeth demands a plentiful supply of children ranging from two to six years, so that this dentition can be studied during its functional lifetime and before the permanent teeth have erupted. Even in a dental hospital this material is not plentiful, while in private practice it is still more scarce, so that comparatively few dentists have the opportunity of seeing a large number of young children. When I started working at the Hospital for Sick Children, Great Ormond Street, it was soon borne upon me that malocclusion of the deciduous dentition was far from uncommon, and all my subsequent experience has only served to confirm this impression. I can state without hesitation that irregularities of the milk teeth are common, and that practically all forms met with in the permanent dentition can be paralleled in the earlier dentition. I have no statistics to offer you, but I would hazard a guess that at least twenty per cent. of young children show some degree of malocclusion. This represents my hospital experience. It is conceivable that an examination of children of a superior social class might show a lesser incidence, though it must not be assumed that the children from working-class homes are for that reason more likely to have contracted deciduous arches.

Many years ago some statistical work on the eruption of teeth which Warwick James and I carried out on children attending Great Ormond Street Hospital, was criticised on the grounds that the children were "sick children." I felt then that this criticism was unfair, and I would suggest that my impressions as to the frequency

* Presidential address delivered to British Society for the Study of Orthodontics, February, 2nd, 1931.

of deciduous malocclusion are not invalidated because they have been obtained chiefly from a children's hospital. These children are not usually sick in the sense that they are ailing or generally of poor nutrition. On the contrary, their nutrition is on the whole good, and though they attended the dental clinic because of some dental defect, yet I would contend that they were a fair sample of an industrial urban population. Whether a social grading of the child population in regard to dental defects would show that children from the upper or middle social strata had better teeth or better jaws, is a point on which I cannot offer any opinion worth having, though I would surmise that the children of good social class might show a smaller incidence of certain forms of malocclusion, such as open bite or the irregularity resulting from the premature loss of deciduous teeth.

I have been able to collect notes and models of a considerable number of cases of deciduous malocclusion, and I propose to attempt a descriptive classification. Broadly speaking, deciduous malocclusion falls into three categories :—

(1) Those cases which commence *ab initio* and depend on some defective or abnormal growth factor. Thus, some forms of deciduous malocclusion may be predetermined by reason of abnormal bone growth. Some at least of the cases of post-normal occlusion belong to this category, and though it would be paradoxical to speak of post-normal occlusion in a new-born baby, yet there is little doubt that a mandibular retrusion may exist. Similarly, pre-normal occlusion —of the inherited type—is undoubtedly another example.

(2) Malocclusion which developes subsequently to the completion of the deciduous dentition. Such cases might only be delayed examples of the first group. But I believe that there are cases of a normal deciduous dentition which subsequently become abnormal. The failure of spacing seems to me to be such an example, though perhaps not invariably. The lateral type of open bite in which the deciduous molars fail to occlude is another. A faulty occlusion may be induced by caries and a bite of convenience may later on become stabilised as the anatomical bite.

(3) Malocclusion may be due to some external cause, such as habits of different kinds, injury, or disease. This is only a sub-variety of the second group, but it is helpful on clinical grounds to differentiate such cases from those in the second class.

I now pass to a consideration of the different types of malocclusion. The difficulty of defining what constitutes the normal is as great in the deciduous as in the permanent dentition. But I would suggest that in the former it is legitimate to restrict the limits of normal variation within narrower bounds and to regard comparatively minor variations as constituting malocclusion. My reason is that usually deciduous malocclusion tends to become accentuated in the permanent dentition, and it is thus important to recognise the significance of slight irregularities which, trivial in themselves, may become serious in later years.

Types of Deciduous Malocclusion.

(1) *Contracted Arches.*—Perhaps the most common type of deciduous malocclusion is a general crowding of the arches, chiefly apparent in the incisor region and affecting the lower incisors more than the

upper. The occlusal edges of the incisors should form a symmetrical curve. But in these cases the edges form a zig-zag like a shallow W. The majority of cases are of this slight type, but one may sometimes see more severe cases in which the incisors are definitely imbricated. (Figs. 1, 2.)

(2) *Failure of Spacing.*—Failure to show the spacing in the incisor region which should normally occur at about the age of four, is a common variety of malocclusion. It falls into the second group of those cases which arise subsequently to the development of a dentition which up to that time may be normal. In my experience, when this spacing does not occur, the attrition of the incisors, which I regard as equally a concomitant change in normal jaws, is also absent. I should like to know whether others have also noticed this. Another impression I have gained, though without being in a position to offer any evidence, is that in cases of contracted arches in which there is a positive degree of malocclusion from the commencement, spacing does not occur later, so that the subsequent permanent malocclusion is likely to be severe.

(3) *Antero-posterior Malocclusion with Normal Molar Occlusion* (*Angle's Class I*).—Cases of true superior protrusion with a normal molar occlusion are not common in the deciduous dentition. It is true that cases which appear to fall into this group are comparatively common, but when we analyse them we find that they are either examples of post-normal occlusion with an associated superior protrusion, or that they are associated with open bite. I have, however, seen a few cases of superior protrusion, though without the deep overbite which commonly accompanies the condition in the permanent dentition. A true edge-to-edge bite with neutral molar occlusion may occur, and I have collected some examples. Whether such cases might be transformed into a true inferior protrusion in the permanent dentition is an interesting point. My own belief is that they do not, and that if we accept a mesial molar occlusion as the criterion of inferior protrusion, then this form of malocclusion exists as such in both dentitions.

(4) *Antero-posterior Malocclusion with Post-normal Occlusion and Maxillary Protrusion* (*Angle's Class II, Division* 1).— Post-normal occlusion with an associated maxillary protrusion is not uncommon in the deciduous dentition. I have seen a good many examples of a degree comparable to that occurring in the permanent dentition. The clinical features are the same except that it is unusual to find the lower incisors biting on the palate. Indeed, there is more often some degree of open bite. I feel sure that well-marked examples of post-normal occlusion with maxillary protrusion must erupt as such, and that while the condition may become more marked as age advances, yet the mandibular retrusion is present in the pre-dental stage. It is however, difficult to obtain histories bearing on this point. In only one case could I get any reliable evidence. The grandmother who brought the child stated that it was born with a prominent jaw in front. No forceps were used in delivering the child, and so far as I could learn, birth was normal. The child was bottle-fed ; a dummy was used up to three months, but the child was not a thumb-sucker. (Fig. 3.) In one case the post-normal occlusion was unilateral, being present on the right side.

(5) *Antero-posterior Malocclusion : Post-normal Occlusion with Maxillary Retrusion* (*Angle's Class II, Division* 2).—The condition known as Angle's Class II, Division 2, is less common in the permanent dentition than Class II, Division 1, though sufficiently common to be familiar. The clinical picture is unmistakable; the retroclination of the upper centrals, the proclination of the upper laterals and the deep overbite make up a condition easily recognisable. In the deciduous dentition I regard this type as being the rarest of all forms of malocclusion. In the whole of my experience I have not come across a typical example in the deciduous dentition. But that such cases do exist is evident, for Sir Norman Bennett has shown me the models of a child of 5 years in which there is post-normal occlusion with retroclination of the centrals. (Fig. 4.) No doubt if this case had been left alone the condition would have become more marked, and would eventually have assumed the characteristic features of this form of malocclusion. The apparent rarity of this condition contrasted with its relative frequency in the permanent dentition, raises some interesting points to which I shall refer later. The nearest approach to a Class II, Division 2 type of which I have any record, are two sets of models. The first shows a post-normal occlusion on the right side only. There is no maxillary protrusion, but there is a deep overbite. The second is even more interesting. The child was 6 years 2 months; there is bilateral post-normal occlusion, but the upper arch is perfectly proportioned to the lower arch, so that there is no incisor irregularity and the arch relationships, though anatomically incorrect, are yet harmonious. (Fig. 5.) I have seen a similar condition in the permanent dentition. I have never seen any other examples in either dentition and, rightly or wrongly, have regarded this condition as being extremely rare. Such a condition as this tends to support the thesis put forward by Sir Norman Bennett, that there may be an evolutionary tendency towards a post-normal occlusion as the normal relationship of the future.

(6) *Inferior Protrusion with Pre-normal Occlusion* (*Angle's Class* III).—True cases of inferior protrusion in the deciduous dentition are usually thought to be rare. I have, however, collected eight cases. In some the incisor relationship has been edge-to-edge, but the molar occlusion has shown that they were true examples of pre-normal occlusion. Beyond noting the existence of this condition in the deciduous dentition there is little more to be said about it, except that it is essentially one of those types of malocclusion which tend to become accentuated in the permanent dentition, and that cases of edge-to-edge bite with mesial molar occlusion will almost certainly become well-marked examples of inferior protrusion in later life. (Figs. 6, 7, 8.)

(7) *Malocclusion in the Transverse Plane.*—The common form of malocclusion in the transverse plane is a lingual occlusion of the upper molars. I have seen several examples of this. In some cases the lingual occlusion has been bilateral, while in others it has been unilateral. The condition may be the only irregularity present; it may be associated with open bite or it may be part of a general inferior protrusion; in this latter case the lingual occlusion may be only apparent, for the fault may lie primarily in the mandibular teeth. The unilateral type of lingual occlusion has sometimes been ascribed

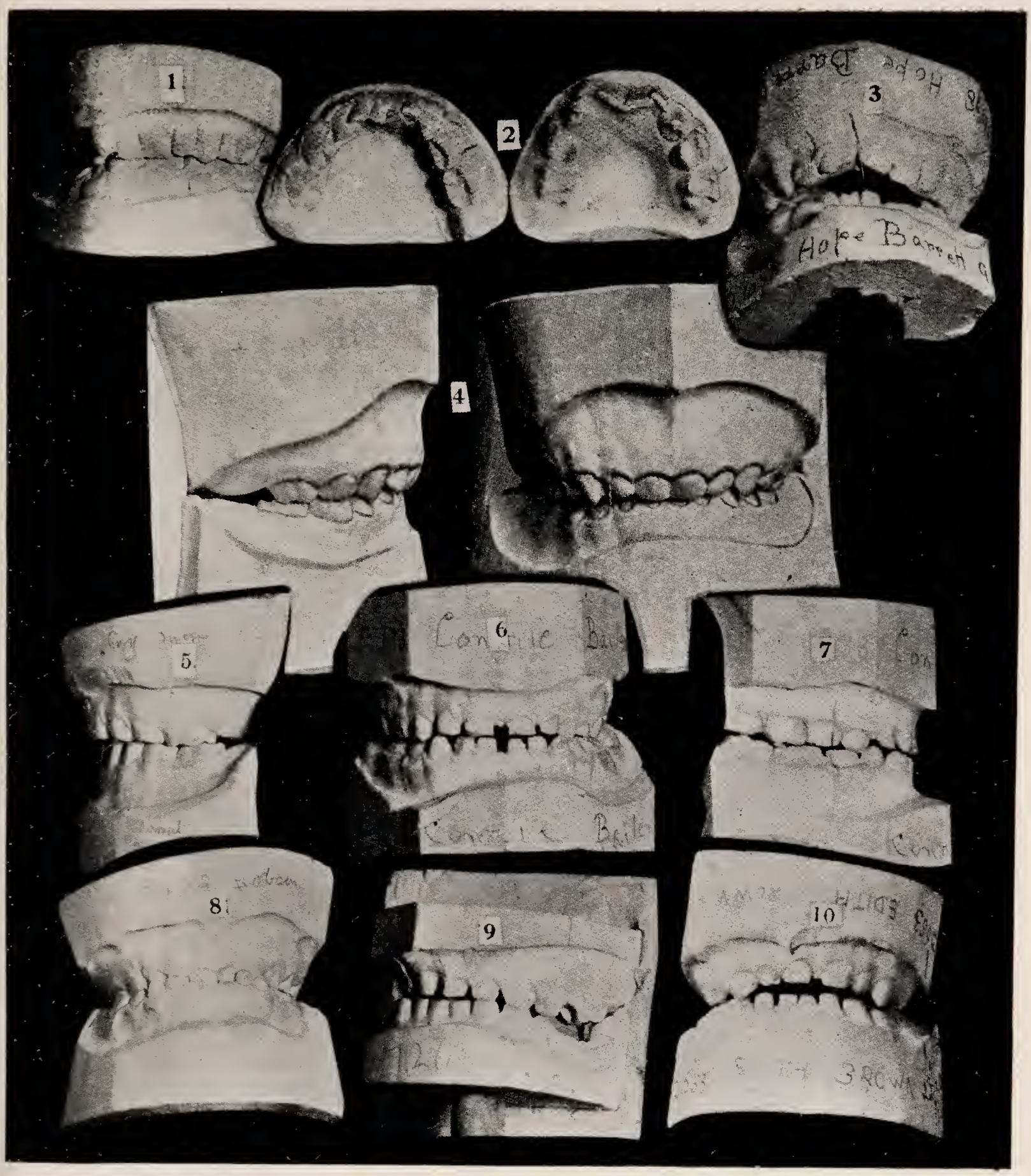


Fig. 1. Contracted arch. Ant. view.

Fig. 2. Same models, palatal aspect.

Fig. 3. Post-normal occlusion, Class II, Division 1. History that child was born with prominent jaw.

Fig. 4. Post-normal occlusion with maxillary retrusion (Class II, Division 2). Female, age 5. (By permission of Sir Norman Bennett.)

Fig. 5. Post-normal occlusion with upper and lower arches in harmony. Male, 6 years, 2 months.

Fig. 6. Edge-to-edge bite with mesial occlusion, ant. view. Female.

Fig. 7. Same models showing occlusion on right side.

Fig. 8. Female, 8 years, with mesial occlusion (Class III). The mother had inferior protrusion while the father had a marked degree of post-normal occlusion with maxillary retrusion (Class II, Division 2).

Fig. 9. A case of cross bite. On closing the mouth the jaw deviates to the left side.

Fig. 10. Open bite. History of tongue sucking and use of a dummy.

Illustrating Mr. A. T. Pitt's communication.

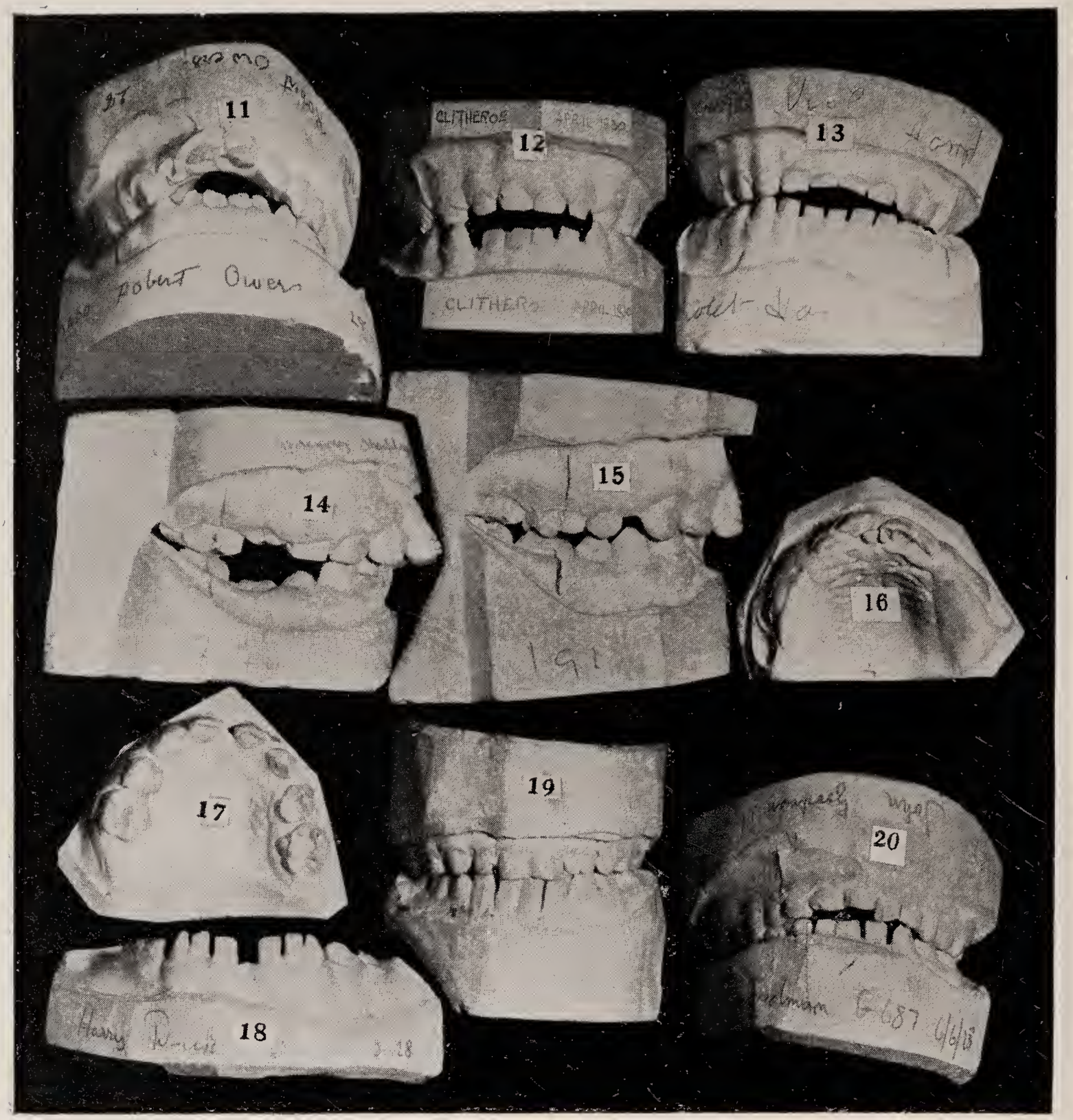


Fig. 11. Open bite with superior protrusion. Dummy used at night. Mother noticed prominence of jaw as soon as teeth erupted.

Fig. 12. Open bite of the parallel type with no proclination of upper incisors or retroclination of lower incisors.

Fig. 13. Open bite with marked attrition of upper and lower incisors. No history of tongue or thumb sucking or pencil biting.

Fig. 14. Open bite, lateral type. Female aged 9, showing failure of occlusion of deciduous molars on right side. The same condition was present on left side.

Fig. 15. Same child showing occlusion of premolars three years later.

Fig. 16. Male, aged 1 year, with wide separation of centrals caused by frænum which has also produced torsion of right central. Note abnormal development of the cingula.

Fig. 17. Congenital absence of $\underline{B\,|\,B}$ confirmed by radiographs.

Fig. 18. Gemination of $\overline{C\ B\,|\,B\ C}$ which has led to wide separation of $\underline{A\,|\,A}$.

Fig. 19. Dichotomy of $\underline{|\,B}$; the increased width of this tooth has not led to crowding.

Fig. 20. Supernumerary tooth present between $\underline{C\ B\,|}$. The arch is displaced forwards apparently as a result of the extra tooth.

Illustrating Mr. A. T. Pitt's communication.

to pillow habits. I have attempted to obtain corroboration of this, but so far I have signally failed. In one case I thought I had obtained evidence of a pillow habit as the cause of a unilateral lingual occlusion, for the mother stated that the child always went to sleep with the fist doubled up under the cheek. But she also said that sometimes it was the left fist and sometimes the right fist, which did not fit in with a lingual occlusion on one side.

A lingual occlusion of the upper molars implies an upper arch too small for the lower arch. Theoretically, the opposite condition of an upper arch too large for the lower arch might also occur. I have seen one case which might be regarded as coming into this category: a child of five with what I should regard as an excessive labial occlusion of the upper molars associated with spacing of all teeth.

Cross Bite.—Another type of malocclusion in the transverse plane is the condition of cross bite. I have only one record of this, though I am inclined to think that it is less rare than this would indicate, and that I may have overlooked examples. The condition suggests that the bite is one of convenience, induced either by some abnormal position of a tooth which acts as an inclined plane throwing the jaw to one side, or that it may be produced by caries, which may lead the child either to avoid a painful tooth or to seek efficient mastication. (Fig. 9.)

(8) *Malocclusion Occurring in the Vertical Plane.*—Malocclusion in the vertical plane may manifest itself as an open bite or as the opposite condition of close bite or overbite.

Open Bite.—Open bite is undoubtedly the most common form of malocclusion in the deciduous dentition, though in the permanent dentition it is relatively rare. Conversely, close bite is more common in the permanent dentition than in the deciduous dentition.

I have seen more examples of open bite in the deciduous dentition than of any other type of irregularity. Two types can be recognised: (*a*) the anterior open bite affecting the incisors, which is common, and (*b*) the lateral type affecting the deciduous molars, which is rare.

Anterior open bite is frequently regarded as being due to habits such as thumb or tongue sucking or the use of a dummy. A typical case presents not only a space between the upper and lower incisors, but also a proclination of the upper incisors and a retroclination of the lower incisors. Indeed, the abnormality in the antero-posterior plane may be greater than the vertical defect and the actual gap between the cutting edges of the upper and lower incisors may be relatively slight. While the term, open bite may be justified on clinical grounds, yet the antero-posterior malocclusion should not be forgotten, for it is probable that it is this latter defect which is perpetuated in the permanent dentition rather than the vertical defect. But cases of open bite in which the slope of the incisors appears to be normal, so that the malocclusion is entirely in the vertical plane, may occur. (Figs. 10, 11, 12.)

A particularly interesting variant, of which I have collected a few examples, is the co-existence of marked attrition of the incisors with open bite. How can this be explained? Attrition of a tooth implies an agent causing the attrition. In such cases the mutual occlusion of the upper and lower incisors is absent, so that this, the normal cause of attrition, cannot be invoked. A habit such as pencil biting might bring about both attrition and open bite, but I have

not obtained any evidence of this. In one case of open bite with attrition there was no history of thumb or tongue sucking. (Fig. 13.) With regard to the vexed question of habit in relation to open bite, I have an open mind, but I am inclined to think that the importance of habit as a causal factor has been over-estimated. It would be an easy matter, as my records show, to produce a number of cases of open bite in which there was a history of a habit, and an equal number of similar cases in which the existence of such habits was strenuously denied by the parents. When a mother specifically states that a child does not suck its thumb, I feel that this statement must be accepted. With regard to the action of the dummy comforter, I would point out that almost all children seen at hospital suck dummies at some time or other. If the use of the dummy were a cause of open bite, then this condition should be more common than it is. Perhaps the explanation may be that some other factor in addition to the habit is required in order to bring about the open bite. But what this *tertium quid* is, if it exists, I do not know.

Lateral Open Bite.—The lateral type of over bite in which the deciduous molars fail to occlude is less common. All varieties may be met with, from a slight failure of occlusion up to a condition in which the occlusal surfaces of the molars are flush with the gum or even below the gum level. I cannot help thinking that this condition is one which developes subsequently to the eruption of the molars which originally were in occlusion. But I have not been able to observe the development of this condition or to obtain any history bearing on this point. The condition may become cured with the eruption of the premolars, but I should doubt if this always occurs. Perhaps the possibility of cure with the eruption of the premolars depends on the extent of open bite, and that when the deciduous molars are as it were forced into the gum, there is the danger that the permanent molars may tilt forward and oppose a mechanical obstacle to the normal shedding of the deciduous molars. I have seen one or two cases in which this appeared to have happened, with the result that the deciduous molar had become partly buried and the premolar had not been able to erupt. (Figs. 14, 15.)

Close Bite.—Close bite is rare in the deciduous dentition, and the only examples I have seen have been cases of post-normal occlusion already referred to.

(9) *Miscellaneous Varieties of Malocclusion.*—The last class comprises a variety of conditions which though unrelated usually affect individual teeth rather than the whole arch. Clinically they may be of small importance, though not without interest. Separation of the upper centrals by a persistent frænum may occur. In one case, in a child of 12 months, the frænum, in addition to producing separation, has also caused some degree of rotation of the right central. (Fig. 16.)

Deficiency in the number of deciduous teeth should be regarded as a form of malocclusion in the strict sense of the word. The deficiency in teeth may be part of a congenital ectodermal defect. In these cases most of the teeth are absent. I have seen two cases of absence of the upper laterals which in my experience is rare. In both cases the absence was confirmed by radiographic examination. (Fig. 17.) Whether this was followed by absence of the permanent laterals, I do not know. When a permanent tooth is absent such as a second premolar, the preceding deciduous tooth is present. May the converse hold good that when a deciduous tooth is absent, its

successor may be present? This is a point on which I should like information.

Gemination.—Gemination of two incisors or of an incisor and canine is not uncommon. It may be regarded by some as straining a point to consider such a condition as constituting malocclusion, but it must be remembered that the arch may be correspondingly diminished because the geminated teeth occupy less space than two normal teeth, and that this may lessen the room for the successional teeth. On the other hand, the gemination may not affect bone growth, as in one case in which there was gemination on both sides in the lower jaw, which had led to unusual spacing. (Fig. 18.)

Dichotomy of a tooth or the presence of a supernumerary may similarly be regarded as a form of malocclusion, though for an opposite reason than holds for gemination. In these cases we have an extra amount of tooth substance interpolated in the dental arch which may displace other teeth. It is a curious fact that whereas the presence of a supernumerary in the incisor region of the permanent dentition nearly always leads to severe irregularity, in the deciduous dentition the arch often appears to accommodate itself to the extra tooth. (Fig. 19.) But a careful examination will often show that the extra tooth or the increased width of a tooth which has undergone partial dichotomy is not without its effect. Thus in one case there was some degree of superior protrusion which it seemed reasonable to attribute to the supernumerary tooth. (Fig. 20.) In another case the molar occlusion on the side of which there was a supernumerary was post-normal, while on the other side it was neutral.

I now propose to discuss some of the hypothetical or potential relationships between deciduous and permanent malocclusion. In considering the evolution of malocclusion generally it would be helpful if we knew in detail the sequence of events. Are the early symptoms of some particular form of permanent malocclusion always specific, or may they be non-specific? That is, can a certain type of malocclusion begin in more than one way and conversely, can some form of deciduous malocclusion end in more than one type of permanent malocclusion? Now it is evident that the change over from the deciduous to the permanent dentition carries with it the possibility of effecting great changes both of kind and degree on the further evolution of any existing malocclusion, or itself may be able to initiate the development of malocclusion hitherto absent. We might compare this change-over to a railway junction. Some trains progress from their terminus to their destination without receiving any check at the junction. Others are switched over to other tracks; some may stop at the junction, while others may start from there. Thus, to understand a railway system would necessitate a study of what goes on at the junction. Transferring the analogy to the study of malocclusion, we may say that some of the changes which occur are known; some we can surmise with fair accuracy, but there are others of which we are ignorant. It seemed to me that it might be possible to express graphically by the use of symbols the various changes which the translation from the deciduous to the permanent dentition might bring about, and that if the relationships between the two dentitions were put in a form resembling an algebraic equation, it would show the theoretical relationships possible, and in so doing provide a criterion both of the extent of our knowledge and of our ignorance.

Four possible relationships at once suggest themselves.*

(1)

$$o = O$$

where a normal deciduous dentition is followed by a normal permanent dentition. This obviously needs no comment.

(2)

$$o = X.$$

In this case a normal deciduous dentition is followed by malocclusion in the permanent dentition. What evidence is there for this relationship? It is unlikely that it would be true for such forms of malocclusion as post- or pre-normal occlusion, or indeed that any large proportion of cases of permanent malocclusion, could be expressed in this way. One obvious example is the malocclusion resulting from the premature loss of the deciduous teeth. But this form of irregularity, though of great practical importance, is of no etiological interest, for we know only too well how it is produced. Localised displacements of permanent teeth either through some abnormality in their developmental position or because of undue retention of a deciduous predecessor, afford another example. The congenital absence of upper laterals or second premolars may lead to shifting in position of other teeth. A tumour pressing on the arches may bring about malocclusion, sometimes of a severe degree. But cases of this kind are either rare or only affect the arches slightly. Of more importance is the question as to whether the generalised types of malocclusion affecting the arches as a whole, can originate in the permanent dentition without some degree of deciduous malocclusion as a precursor.

(3) The third equation would be:

$$x = O$$

where the malocclusion of the deciduous dentition is followed by a normal permanent dentition. At first sight, it might seem that such a relationship is hypothetical and does not exist in practice. But it may be possible though infrequent. Thus, spacing of the upper deciduous centrals may become closed in the permanent dentition by reason of the larger size of the incisors. The lateral type of open bite, as already shown, may disappear with the eruption of the premolars.

(4) The fourth and most common relationship is represented by:

$$x = X$$

where deciduous malocclusion is followed by permanent malocclusion. This relationship presents several possible variations. The relationship may be a quantitative one and could be expressed as follows:

$$a, b, c, \text{etc.} = A, B, C, \text{etc.}$$

But such an equation would imply that the quantitative relations between the deciduous and permanent malocclusion were the same. Usually, we find that the degree of permanent malocclusion is greater, and the relationship would be more correctly expressed in this way:

$$a, b, c, \text{etc.} = A+, B+, C+, \text{etc.}$$

This is very obvious in pre-normal occlusion, in many cases of post-normal occlusion, and in the permanent malocclusion following deciduous contracted arches.

* The symbols on the left side represent the deciduous dentition and those on the right the permanent dentition. The former are in small type and the latter in capitals.

But there is the further possibility of a qualitative change in the character of the deciduous and permanent malocclusion, and the former may be followed by an irregularity of a different type. To revert to the analogy of the railway junction, the train is switched off on to another route. We know comparatively little about the qualitative changes which are possible at the change over from the deciduous to the permanent dentitions. I do not know of any literature dealing specifically with this point, though I imagine that most orthodontists have realised that some types of permanent malocclusion may have existed in a different form in the deciduous dentition. The broad relationship could be expressed in this way :

$$x = Y.$$

I am not in a position to offer any very positive evidence that such a relationship exists, but there are reasons which seem to me to justify its assumption. As already stated, open bite is very common in the deciduous dentition, but relatively uncommon in the permanent dentition. What has happened ? I believe that the explanation is that the type of malocclusion changes. The vertical defect tends to disappear, but the antero-posterior defect is perpetuated, and produces superior protrusion with a flattening of the lower incisor arch. I have seen this occur in one case, and I believe that if a number of cases of open bite were followed up (a difficult thing to do in hospital practice), it would be found to occur fairly often. Now let us survey the question from the other end. As I have already said Class II, Division 2, cases in the permanent dentition are not infrequent, but are excessively rare in the deciduous dentition. The permanent malocclusion forms such a distinct clinical entity that it seems reasonable to suppose that it must have a deciduous precursor equally distinct. I am not in a position to state what that precursor is, and my argument is a theoretical one. If we concede that this hypothesis is at least an arguable proposition, then the relationship between deciduous and permanent malocclusion might be put in more than one form. The relationship, although showing a qualitative difference, might yet be a specific one, and a particular form of deciduous malocclusion might be always or usually followed by a particular form of permanent malocclusion, just as a tadpole always turns into a frog. The relationship could be expressed as follows :

$$a = B,$$

in which there is a specific relationship between the deciduous and permanent malocclusion.

But it might also be possible that the relationship is not always specific, and that a particular type of deciduous malocclusion may be capable of transformation into more than one form of permanent malocclusion ; and conversely, a particular type of permanent malocclusion may evolve out of more than one type of deciduous malocclusion. Such hypothetical relationships could be expressed in the following forms :

$$a, b, c, \text{etc.} = D$$

—where a specific type of permanent malocclusion can be preceded by more than one type of deciduous malocclusion ; and :

$$a = D, E, F, \text{etc.},$$

where a particular type of deciduous malocclusion can evolve into more than one form of permanent malocclusion.

How far such relationships have a foundation in fact still remains to be proved. I have not been able to follow up a large enough number of cases to prove that these hypothetical relationships do exist. I can only surmise that they are possible, though I hope that I have been able to provide a few indications which suggest that they are not entirely fanciful on my part. I am conscious that my observations have embodied a large amount of speculation and a small amount of fact. Yet speculations have a limited use, and I offer them in the hope that they will stimulate a further study of certain aspects of malocclusion in its early stages which are little known.

Discussion.

Mr. George Northcroft wished entirely to endorse all that the President had said about the necessity for the intensive study of malocclusion of the deciduous dentition, especially if members wished to live up to the name of their Society. He thought that the study of orthodontics started with malocclusions of the deciduous teeth, or probably before the eruption of any teeth, and he hoped the address would stimulate the younger members to observe and record by models those anomalies which came under their observation. By the collection of such data he was convinced that the key would at last be found which would open the way to the elucidation of what at present seemed insoluble problems. From his own preliminary observations at a welfare clinic of some hundred children aged from 2 to 5, he was inclined to think that malocclusion of the deciduous dentition, other than in cases where it was caused by too early loss, was rarer amongst the children of industrials than among other workers. Contrary to the President's finding, he was of the opinion that close bite in children of the industrial class was more common than the open bite. He found open bite rare, and this was interesting because his own observations covered a different region of London to that which figured in the President's investigation. He believed that malocclusion did not necessarily arise in the deciduous dentition. He had shown one case of post-normal occlusion arising from a condition caused by a failure in development in the canine region. It was shown by measurement what was the normal rate of growth in the canine width, and in this particular case the growth in maxillary width had lagged behind the mandibular width, and post-normal occlusion was the result. He thought that the President's symbolic representation of possible permutations and combinations of malocclusion was very happy, and likely to help them all to think clearly, and he hoped that it would be followed up by casual communications on the subject. He thanked the President for a very stimulating address.

Mr. R. Cutler agreed with Mr. Northcroft that the President's address had furnished much food for thought. He had talked widely and comprehensively on a matter which was one of the most important in the specialty. As one's orthodontic experience grew, and one looked back on past cases, he at least became more and more encouraged by the permanence of the results in cases which had been treated early, and more and more discouraged by the lack of stable results in cases which before treatment were relatively mature. That statement defined the gulf between the orthodontist of, say, seven years' standing and the one of twenty-seven years' standing. The younger practitioner, unless he had unique opportunities for specialised practice at a large hospital, had patiently to feel his way along, treating each complication as it arose and not before. The acquirement of perfected technique was easy enough to one who had a flair for manipulative work, and who made or was given opportunities for practice, but this was not enough. It was not the engineer artificer who brought the ship safely into port, it was the captain on the bridge. This logically led to a question with regard to treatment which the President might think not strictly relevant. Having recognised, say in a child of 4, a specific deformity, would he immediately embark upon treatment, or would he wait for the deformity to be perpetuated in the second dentition ? To the younger men like himself, a dictum from the President on this point would be very helpful indeed. The last speaker had remarked on the silence of the younger men in discussion, but this silence was very often due to a praiseworthy diffidence and a con-

sciousness of ignorance rather than to any lack of a sense of responsibility or to mental sloth.

Mr. J. H. BADCOCK took up the President's question as to the cases where the temporary laterals were absent, and whether their absence was followed by the absence of the permanent laterals. He had a case under his care at the moment where that had happened, and his impression—though it was not more than an impression—was that when temporary laterals were absent, the permanent laterals were seldom present. Of that, however, he was not sure except in the particular case under his care. One thing the President had said rather astonished him, that he found a much larger number of cases of open bite than of closed bite in the temporary dentition. He had no statistics, but in his own private practice he could say that a close bite was far commoner than an open bite in the temporary dentition, and that it was probably the commonest of the malocclusions he had come across.

SIR NORMAN BENNETT: With a normal occlusion or a post-normal ?

Mr. BADCOCK replied that this was with a normal occlusion. The President had also raised the question whether a malocclusion in the temporary teeth might result in a good occlusion in the permanent teeth. He thought that in certain cases it might and did. Take the case of open bite which was caused by the use of "the comforter" or sucking the thumb. There was no doubt whatever that that deformity did disappear in the temporary teeth after the habit had been given up—in other words, that it was purely mechanical. He thought—though here again he was not sure—that retroversion of the upper centrals might disappear in the permanent dentition, as also lingual occlusion of the molars. He thought that when these conditions occurred in the temporary dentition they were not necessarily followed by the same irregularity of the permanent teeth. With regard to Class II, Division 2, the President had questioned whether that irregularity was perpetuated in the permanent dentition. He thought that what decided the difference between Division 1 and Division 2 was what he might call the accidental position of the lower lip, and that that really was the entire determining factor. He had a case which he had shown to the Society where the condition on the one side was that of Division 1, and the condition on the other side was that of Division 2. He thought it was just a matter of chance, and due to the length of the lower lip. It was this which determined whether a Class II case became Division 1 or Division 2 in the permanent dentition.

Mr. H. C. VISICK remarked that the President in his paper had said, that "whereas the presence of supernumerary teeth in the incisor region in the permanent dentition nearly always led to irregularity, in the temporary dentition they seemed to accommodate themselves to the position." Mr. Visick suggested the explanation was that the arch in the temporary dentition was made of teeth and spaces, and if one had an extra tooth, or extra wide teeth, it simply meant that the spaces were encroached upon, and no irregularity of the teeth occurred. The President had said he found that the Class II, Division 2 cases were very rare in the temporary dentition, but they were not infrequent in the permanent dentition. For his own part he saw a quite obvious reason for that. The Class II, Division 2 case was really a Class II, Division 1 case in process of correcting itself by alteration of habit. The Class II, Division 1 case was nearly always associated with mouth breathing, whereas in a Class II, Division 2 case the patient was nearly always a normal breather. The Division 1 case in a temporary dentition occurred in a child who was a mouth breather ; later on he became a normal breather, and the lips closed, but the molar relationship had been upset, and that was not cured by an alteration in the mouth breathing, so that some irregularity remained. During the years of temporary dentition there was not time for a change from a Division 1 to a Division 2 arrangement to take place, but the change did take place after the stage of the temporary teeth. The change of habit having taken place in the breathing, as the permanent teeth erupted they became double-backed under pressure of the lip.

Mr. H. E. MARSH wished to describe to the Society the condition of a family with which he was well acquainted. The family consisted of three boys. Their deciduous dentitions were all Class II, Division 2. The oldest boy was a mouth breather and had a very short upper lip. His present condition was Class II, Division 1 ; he was now 16 years of age. The second boy was not a mouth breather ; his present condition was neutral occlusion on the right

side and post-normal occlusion on the left ; his age was 11. In the third boy the present condition was that of normal occlusion so far as the molars were concerned, but the speaker thought he would probably display some excessive over bite in the front and slightly protruding upper lateral incisors.

Mr. BULLEID said that there was one factor which might have been emphasised a little more, namely, the difference in the class of children in relation to the difference of malocclusion in the temporary dentition. In the cases the President had brought forward he had stated that open bite was the commonest condition in the temporary dentition. These were children of the hospital class. But in private practice the close bite was by far the most common deformity in the deciduous dentition. He supposed that the explanation was that in the hospital class of children bad habits were commoner, and the "dummy" was invariably used, whereas in a better class of society better habits prevailed. He thought there was a good deal to be got from the discussion of a point like that, and, of course, there was so much of importance in separating and correlating the endogenous and exogenous factors in the production of malocclusion, that altogether he thought this address deserved a separate evening for discussion, after members had had a chance to read it. It would certainly not be adequately discussed that night, as so many points of controversy and interest had been raised. Perhaps Mr. Northcroft would start the next discussion by repeating his remarks made this evening.

Miss K. C. SMYTH showed some models through the lantern illustrating close bite. In two of these cases, a brother and sister, the close bite was definitely hereditary, the mother having an excessively close bite. The permanent incisors of the sister had erupted when the models were taken, and the left central was badly rotated. The brother's models showed close bite of the deciduous incisors without other irregularity, but later this boy erupted his left upper central incisor in exactly the same position as his sister's. Miss Smyth showed other models with interesting degrees of close bite in the deciduous dentition.

Mrs. LINDSAY said that even those who had not previously known the President, if they read this paper, would see at once that he had the pen of a ready writer directed by a well-stored mind. He had stated at the end that he had not given many facts, but no one whose experience was not very extensive, could have written such a paper or have given so much pleasure to an appreciative reader. The paper was packed so full of detail that she agreed with Mr. Bulleid that there ought to be another opportunity of discussing it more fully. There were one or two points which she desired to pick out. On the question of inferior protrusion, she had the privilege once of seeing a small child of 9 months, and the mother requested her to feel the child's teeth while the child was asleep. The mouth was closely shut, and the four lower incisors were locked in front of the upper incisors. Later on the child developed a perfectly normal occlusion when the molars erupted. She had noticed often in a child of that age, when the deciduous molars were coming through, the lower jaw was invariably pushed forward. At birth the lower jaw was always in retrusion, and Dr. Robin, of Paris, had taken up the point and had suggested that most bottle-fed children had inferior retrusion because they had no encouragement to put forward the lower jaw. Moreover, they were generally lying on their backs, and the lower jaw was falling backwards. The President had spoken of the frænum separating the upper incisors. Cecil Tait, in New Zealand, had shown that the frænum was not a cause of the separation of the incisors, that the spaced upper centrals were a definite type of dentition, and that it was a very questionable thing whether they should be approximated unless the space on either side could be filled. If the laterals, for instance, were out of position, and were brought into line so closely against the incisors that they kept them in position, or if there was a permanent retention plate. then this procedure might be followed. She once had a very rare specimen of a central lateral and canine in the temporary dentition geminating on both sides. She was very sorry to say that she had parted with the specimen many years ago, and did not know what had become of it, but she thought it a very rare condition.

Mr. MAXWELL STEPHENS said that with regard to inferior protrusion, the jaw might go forward sometimes if there was a tendency to lack of development in the maxilla. If it went forward like that, and remained forward too long,

and the molars did not come though, the maxillary teeth might slip inside the molars and spread them.

Mr. HAROLD CHAPMAN thought that the President's address would become a classic, and therefore it was with the more temerity that he suggested for consideration that instead of classifying the first series as 1, 2 and 3, the President should make 1 and 2 into one group, "general causes," and 3 into a second group, "local causes," the former could then be subdivided into pre-natal and post-natal groups, and also parturient if thought advantageous. He merely suggested that as probably increasing the value of the classification. He did not quite agree with what the President had said about the early stages of Class II cases. Mr. Visick had said that the deciduous arches consisted of teeth and spaces, and so, in a Class II, Division 2 case, if one had the teeth in alignment but no spaces, the deciduous arch is already too small and if there is any crowding of the deciduous teeth the "smallness" is greater still, and as there are no spaces in the permanent dentition, it followed that there must be considerable crowding of the permanent teeth which in Class II, Division 2 cases is expressed in the form of protrusion of the upper laterals. Such prominence of the upper deciduous laterals would be an extreme case of Class II, Division 2 in the permanent dentition. He wished to ask the President whether it was his opinion that some of the cases of deciduous dentitions, without spaces, had originally had spaces between the teeth or whether they had always been in contact as shown by the lantern slides. Mr. Chapman showed through the lantern some models of his own cases, and went on to say that when the President stated that the crowding was greater in the lower arch than in the upper he could only conclude that this was on account of excessive over bite. Like some of those who had already spoken, he did not regard Class II, Division 2 cases as being the rarest in the deciduous dentition ; but, as already explained, they have not usually the same appearance in the latter as they have in the permanent dentition. He agreed with those members who had said that the open bite, referred to in the paper, was due purely to a local cause, and as soon as that cause was removed, the condition corrected itself. With regard to the depressed deciduous molars as the cause of open bite in the molar region of the deciduous teeth, he did not personally regard the condition shown as one cause of open bite, but rather as a normal developmental condition which seemed to occur in some cases. He had a case at the present time of a child of about seven in which one of the first deciduous upper molars had not erupted at all ; one cusp could just be seen ; this was the only case he had seen of that character. In conclusion, it had occurred to him that the hypothetical relations between the deciduous and permanent dentition which the President had described would form a very valuable subject for the museum of the International Congress ; it would certainly be an instructive and valuable addition to that museum. He desired heartily to congratulate the President on his most excellent address.

SIR NORMAN BENNETT spoke with regard to the cases of protrusion and proclination of the upper incisors with a normal bite. The President had quite rightly pointed out that although that was not so very uncommon in the permanent dentition, it did not occur in the deciduous dentition with anything like the same frequency. The speaker thought that the explanation of that was that, partly, there was not time for it, and partly, that the natural tendency with the deciduous dentition from the earliest years onwards was for the gradual production of an edge-to-edge bite. With regard to Class II, Division 2 cases, two or three of the examples shown by Miss Smyth suggested to his mind that they were precursors of the Class II, Division 2 case, even if they could not be described in those terms. He believed that it was the same condition, but there was not the proclination of the laterals. With regard to the difference between Class II, Division 1 and Class II, Division 2, he was not sure whether he agreed with Mr. Badcock. For years he had been teaching what Mr. Badcock had said, but he had never quite believed it! Nor did he quite agree with what Mr. Visick had said, though he did not know what the explanation might be. He believed there was some fundamental difference between Class II, Division 1 and Class II, Division 2 ; he did not think it was only a question of the position of the upper incisors. There was a difference also in the jaw-formation. In the Class II, Division 2 case one often got a narrow parallel-sided arch, and in the Class II, Division 1 case

one did not so often get that. The case the President had shown as an example of Class II, Division 2 of the deciduous dentition happened to be a case with which he himself had had a good deal to do. In this particular case, when the child was five years of age, he started treating the deciduous dentition with intermaxillary traction in the hope that by treating the deciduous teeth the permanent teeth would come into their proper positions, and the occlusion be right also. He was woefully disappointed. He did achieve a certain result with the deciduous teeth, and this continued with the permanent dentition, and he got the occlusion right. He left retention on for a long time, and thought everything was well, but on taking it off, the condition went back on one side only. He got that side right, and then the other side went back. In the end he got what he thought was a tolerable result ; the bite was normal on one side and nearly normal on the other, but there was a malposition of an upper lateral incisor. That was an example of what often happened with treatment of the really difficult cases of this kind. He considered of all the cases of malocclusion that had to be treated on idealistic lines, the cases of Class II, Division 2 were among the most difficult of all. If he might summon up courage to criticise so eminent a comparative anatomist as Mr. Pitts on the subject of the tadpole, he would take exception to Mr. Pitts's analogy. Mr. Pitts had said that just as the tadpole turned into the frog so the deciduous dentition inevitably turned into a particular form of permanent dentition. But the fact was that the tadpole might turn out to be a frog or a toad, and therefore it followed that Mr. Pitts's analogy was false. If he might take up the same analogy—for he would be sorry if it were lost altogether—he would suggest that it be cited as an example of the fact that one did not know what would happen from malocclusion in the deciduous dentition. It might turn into one or another—it might be either a toad or a frog!

Mr. HERSON said that as a visitor and a young member of the profession, he felt he must say something on behalf of those he might be said to represent. Surely, after Sir Norman Bennett's amusing remarks, it must be realised that it was very difficult for a youngster to stand up and make remarks at such a meeting. He wanted to express thanks to the President for this enlightening paper, from which he had learned many things which he had not learned as a student, and those he had learned as a student, Sir Norman Bennett had just suggested might not be true!

Mr. CALE MATTHEWS congratulated the President sincerely on the originality of his address. He himself had advanced some of the possible causes of malocclusion in one or two papers which he had read, and those causes had been particularly stressed by the President that evening. Mr. Northcroft, who had opened the discussion, was the chairman of a committee formed in the Society some years ago which, after a great deal of hard work, issued a report expressing the desire that orthodontic nomenclature should be of a certain character as there set forth. But the speaker had been deeply impressed that evening by the fact that everyone who had taken part in the discussion had ignored that new terminology and reverted to the old classification. He wondered whether orthodontists were becoming retrogressive. He thought it would be well to decide here and now which nomenclature was to be adopted. With regard to the President's address, he hoped that there would be other opportunities for discussing it, because it contained sufficient material to afford scope for further discussions, and even for other papers, either during the present session or the future. In particular it would be interesting to hear from those members who had had the opportunity of attending clinics and welfare centres and following up the work from the eruption of the deciduous dentition until the sixth or seventh year. That was an opportunity that the general practitioner and the exclusive orthodontist very rarely obtained. A fund of information would be acquired in that way which could not be forthcoming in any other.

The PRESIDENT, in replying on the discussion, said that first of all he thanked the members for the complimentary way in which they had discussed his paper, He was gratified to find that he had thrown a stone into the water which had caused so many ripples. It was very obvious that on a subject like this, one could not make statements which would be accepted by everyone. One of the things that had interested him was the number of members who had said that, contrary to his own experience, they had found close bite more common

than the open bite. As he had said, the experiences recorded in the paper were based on hospital cases, and he did adumbrate the possibility that a grading of malocclusion on a social basis might reveal some differences. He instanced the open bite condition as one that might be affected, and thought it probable that cases taken from private practice would show a far smaller incidence of open bite, in contrast to the children in hospital practice. Those concerned in private practice could bring to the subject certain points of view which others dependent on hospital experience had not always the opportunity of gaining. In private practice the cases could be studied more leisurely, but all his work had to be sandwiched in with the actual treatment of the children. He would like to take this opportunity of expressing his sincere appreciation of the arduous and self-sacrificing labours of his clinical assistants who had assisted him for many years. One of the interesting points raised had been with regard to Class II, Division 2. After all, Angle's classification was merely a kind of international language, used very much in the same way as learned people corresponded in the Middle Ages in Latin. It did not necessarily imply an acceptance of Angle's views. What might be called Class II, Division 2 cases presented one of the most puzzling problems in orthodontics. It was obvious that a great deal of work on this question had yet to be done. He still thought that the explanations put forward by different members were not really so simple as they appeared. Mr. Chapman had raised an interesting point about spacing. When one had a case like that which he had shown, with an unusual degree of spacing, he thought probably that such spacing had always been present. But one of the difficulties of hospital practice was that after seeing a case of the kind, one might never see it again. What had been borne in upon him was that even attendance at a children's hospital was not enough for the purpose of studying orthodontics ; one wanted to go to an infant's clinic and watch the children during their first year of life. Mr. Chapman had mentioned a case of failure of eruption of a deciduous molar. He too, had had one case of that kind ; there was apparently no reason for the non-eruption of a right lower deciduous molar. Gradually a cystic condition formed, and he had to remove the tooth. A great many other points had been raised in the discussion, but the hour was late, and he could do no more than thank the members for the patient way in which they had received his address.

On the motion of Mr. Chapman, a hearty vote of thanks was accorded to the President.

POST-NORMAL OCCLUSION AS A MANIFESTATION OF THE "LYMPHATIC STATE."*

By Robert Cutler, L.R.C.P.Lond., M.R.C.S., L.D.S.Eng.

Too often has the accusation been made that the dental profession lacks breadth of vision and full appreciation of the principles of medicine as applied to its own work; not perhaps altogether untruly, for the dental surgeon advances through his early and most impressionable years from the study to the practice of his profession, rather than graduating into it from a generalised working experience of medicine and surgery.

For those of us, therefore, that incline towards orthodontics—itself a very specialised section of dentistry—the danger is even greater that our horizon should be filled by problems of mechanical technique, to the exclusion of those that deal with the causes of disorderly growth in the living organism. So to-night I should for a few moments like to consider with you one such problem, and that is inherited predisposition to disease, and its manifestation in dental deformity.

Dr. Hector Cameron has done much work in elucidating the significance of the child's "diathesis"—that is its inherited predisposition to certain types of abnormality, and had himself early drawn attention to the occurrence of dental irregularity in certain of these conditions.

May I read to you a few lines from his "Diseases of Children" as an apt introduction to our own study of the problem? In his delightfully clear and lucid style he writes as follows: "In this country the word 'Diathesis' is a little out of favour, to many the conception of inborn and inherited tendencies to disease is too vague and too little susceptible of proof to be attractive, . . . yet especially in pediatric work it is clear that, during the last twenty years, interest in the conception of inborn and inherited peculiarities of constitution has steadily grown, so that now a vast literature concerns itself with a consideration of the Lymphatic Diathesis, the Neuro Arthritic Diathesis, and so on. No doubt these names are in a sense only a cloak to cover our ignorance, but as knowledge advances and more precise information as to the nature of disorders becomes available, the part which is to be attributed to constitutional peculiarity will become less and less.

"*Nevertheless the attempt to depict certain types of children who inherit a tendency to suffer from a variety of closely related symptoms is not without a certain value in practice.* If experience shows that a too-great liability to suffer from particular symptoms, or trains of symptoms, can be prevented, or lessened, by modification of the management generally or of the diet in particular, *then the study of diathesis becomes of practical importance*, while it need in no way diminish our zeal for precise and accurate diagnosis."

It was my privilege to work under him at Guy's and later under Mr. F. Bocquet Bull's directorship in the children's department of the Dental School, and to-night is an opportunity to acquaint you with the general results of investigation of much orthodontic material considered in the light of such modern conceptions of disease. Clinical estimation and examination of the inherited predisposition to abnormality is particularly easy in the early years, before standardised modes of upbringing and common infections have had time to smear the slate and obscure the message which is there for all of us—who are wise enough—to interpret.

Of these diatheses, analysis of the "catarrhal" or "lymphatic"

* *Transactions* of British Society for the Study of Orthodontics.

state—when considered in relation to our own work—yields by far the most fruitful results, and moreover, has this added advantage, that it can be easily studied by such as ourselves, who have a relatively limited medical and pathological knowledge.

As a contrast to the lymphatic state, the "neuro arthritic" or "acidotic" state yields the sharpest contrast, not only clinically and biochemically, but also in relation to such orthodontic manifestations as we are considering to-night. I will later briefly describe the characteristics of this type, but only to throw into sharper relief certain features of the object of our study this evening. By what manifestations, then, can we arrive at a definite conclusion as to the presence, and as to the extent, of this inherited predisposition to what—for want of a better term—I have called "lymphatism"?

In Appearance as a fat, flabby, usually fair child, the hair coarse in texture, almost towy in nature; eyelashes and eyebrows rather sparse (especially in the outer third), a thick opaque skin, florid cheeks, depressed bridge to the nose with shallow eye-sockets, giving an "ironed-out" appearance to the face.

In Mentality.—A tendency to be dull, passive, lethargic, and with slow reaction to both personal and impersonal environment.

Physical Examination shows overweight, the whole body, arms, legs, thighs, are too well covered, whilst the musculature is in poor condition.

Clinical Examination discloses one of the characteristic features of the condition, and that is the totally inadequate control of lymph balance in the general body tissue. The tissues are *hydrolabile* or, in other words, without self-government in regard to their water content, so that even slight nutritional defects, especially in regard to excessive carbohydrate intake, in some way cause the watery body fluids to accumulate in, and waterlog the whole system, the overflow, as it were, appearing as an exudate of catarrhal type either from the mucous membranes, or from the secreting or execreting systems generally.

There is thus a tendency to running eyes, the conjunctivitis occurring as a complication of measles being often very severe; there is running of the ears, the middle-ear complications of scarlet fever tending to become chronic, eventually leading to deafness (although this frequently occurrs independently in the lymphatic subject as a result of chronic Eustachian catarrh). There is running of the nose so aptly and euphoniously described as "snuffles," the lung bases are waterlogged, having as their special symptoms bronchitis and chronic cough, while cuts and scratches do not heal well but remain moist and tend to develop as eczematous condition.

Correlated with—or possibly contingent upon—this inadequate control of lymph balance, there is a most noticeable lack of tissue resistance to the common chronic infections.

Low-grade infection of these tissues exudates rapidly supervenes, the infected areas draining into the lymph gland systems, so that proliferation of the various related groups of lymphatic glands rapidly occurs; *thus enlarged tonsils and adenoids are very common*, and this is the first signpost for you to remark having regard to our subject to-night, but let us not for one moment forget that the term "lymphatic state" connotes inadequate body lymph balance, *and not in any sense a primary specialised lymph gland change.*

Now those of you engaged wholly in exclusive practice may not readily recognise the rather exaggerated type picture which has been portrayed, but this is simply because the unfavourable elements which play havoc with this tendency are usually not operative.

In hospital practice, on the other hand, these elements of faulty nutrition and catarrhal infection exploit the retrograde possibilities of the lymphatic predisposition to the uttermost; it has already been

stated that the waterlogging of the tissues is largely due to excess of carbohydrate food, *and it is carbohydrate that is eaten to excess* by the vast numbers which constitute the lower strata of society, and that only because it is cheap food. Proteins, fats, vegetables and fruits are relatively dear foods, whilst bread, buns, cakes potatoes, have a high bulk value and easily satisfy the hunger pangs of a large and clamorous family. Again, under existing economic conditions such children are herded together in schools and grossly overcrowded homes, so that catarrhal infection spreads rapidly, and finds a rich and ever-fruitful soil in the lymphatic subject. On the other hand, amongst normally well-to-do people, nutrition is not jeopardised by expense, whilst there is almost always some attempt at collective or individual segregation of infected children.

In this way the grosser symptoms of lymphatism are less manifest, and may in fact be overlooked, but the picture is there, complete in every detail, though its colourings and markings may call for closer scrutiny. So now logically we come to the matter suggested by the title of the paper to-night, so that I must state my case for you to confirm or deny.

It is that this type of child, with its hereditary tendency to waterlogging of the tissues, and low resistance to infection, which manifests post-normality and certain maxillary defects of protrusion, as one of its many stigmata, coincident and coequal, with its fair hair, its sparse eyebrows, its enlarged tonsils and adenoids, and its flabby musculature. This generalisation is indeed no new supposition, as the coexistence of certain medical conditions with this deformity of the jaws has long since been acknowledged, but the details of that relation have not previously been accurately formulated, and I do feel that this conception does at least bring our work into line with current medical thought in regard to disease.

We can readily survey past approaches to the problem by perusal of previous issues of the *Transactions* of our Society—sometimes entertaining, always instructive—but in this connection especially so. In 1923 Mr. Davies contributed an article on mouth breathing in which I read the following : " The mouth breather of long duration possesses a thin, poorly developed nose, . . . there is early morning dry mouth and headache, there is want of tone and clearness of speech, with susceptibility to catarrhal and middle-ear deafness. Such a patient is susceptible to catarrhal attacks and suffers from prolonged and frequent colds, . . . while the open mouth, flat chest and occasional hardness of hearing give the impression of a want of intelligence and alertness." Such is a very fair description of the modern conception of the lymphatic state. Again, in 1914—seventeen years ago—Mr. T. B. Layton, the otolaryngologist, discusses some investigations into the effects of mouth breathing on dental deformity.

He writes : " There are four possibilities in the relation of nasal obstruction—due to adenoids—with dental deformity :—

" (1) That it is a coincidence that both lesions occur in the same person.

" (2) The two may be dependent upon some common cause.

" (3) That by an associated mouth breathing, the maxillary deformity may cause nasal obstruction and adenoids.

" (4) That the adenoids, by initiating mouth breathing, cause the deformity."

In further support of the second view, i.e. that both are dependent upon some common cause, he quotes Rollinson Whittaker as follows : " In a given hundred children suffering from nasal obstruction, one may expect to find about thirty having marked maxillary deformity, whilst *fifty will have fairly normal arches whatever the degree of obstruction. Maxillary deformity on the one hand, and nasal obstruction on the other,*

when found present together, are not in any degree whatsoever dependent the one upon the other. Both are independent coincidental manifestations of a general pathological state which shows many other though less obvious signs, and this condition is, in the main, due to an inadequate thyroid secretion."

This is an intensely instructive observation because we now know that iodine, and in some cases thyroid gland, are valuable preparations in the treatment of the lymphatic state. Again, only last year, in an interesting communication to the Society upon post-normal occlusion, Mr. Cale Matthews begins in this manner: "During last summer the *Daily Mail* had a National Photographic Competition to decide upon the most beautiful child in England; and in looking through the pictures illustrated in the paper it seemed to me that the majority of these children had post-normal occlusion."

An astute and perfectly correct observation this, and one having the closest bearing upon our subject to-night, because we know that the lymphatic infant—before faulty nutrition and catarrhal infection has taken its toll—is, in Cameron's words, plump and goodly, and in the eyes of lay judges supremely beautiful; necessarily they are blind to the significance of the correlated fair hair, uptilted nose concealing the flattened bridge, and the overplumpness of the limbs, whilst the floridity of the cheeks passes as an index of perfect health. (A patient exhibiting marked lymphatism was then shown together with several large clinical photographs, together with a series of case reports with small photographic insets.)

And now just for a few moments I would like to draw your attention to a diametrically opposed condition, and that is the predisposition to abnormality known as the "neuro arthritic" or "acidotic" state.

In Appearance the child is thin, wiry, pale, and usually dark, the hair is crisp, whilst the eyebrows are well marked and the eyelashes thick; the eyes are dark, the skin smooth, pale and transparent, while the eye sockets are deep.

In Mentality the child is quick, alert, eager, passionate and excitable at times, for no child can be a paragon, and with a rapid reaction to both personal and impersonal environment.

Physical Examination shows usually a subnormal weight, the musculature may be ill-conditioned—for a reason to be explained later—but there is no hint of waterlogging of the tissues.

Clinical Examination shows that these children tend to an over-ready disturbance of their carbohydrate metabolism. (Normally carbohydrate in the form of sugars, etc., form a great source of easily utilised energy, whilst fats, which also have a high heat energy value, can only be metabolised to form energy if sufficient carbohydrate is circulating to bring about the breakdown reactions.) These acidotic children, in virtue of their intense physical and emotional reactions, burn up their sugar reserves quickly, so that the fats are insufficiently metabolised; intermediate toxic bodies are formed (ketones) which are acid in reaction, and lead to a diminution of the normal alkali reserve; clinical symptoms of acidosis then tend to obtrude, such as vomiting, joint pains, irritability, postural defects, this condition being often accentuated by parents cutting down the necessary carbohydrate intake provided by sweets, iced cakes, sugar, etc. In this connection the following chart illustrating normal metabolism may be of help, in case the significance of the foregoing has not been fully emphasised.

SCHEME OF METABOLISM.

Food intake consists of protein, fat and carbohydrate.

Protein.	*Carbohydrate.*	*Fats.*
Used to repair body tissues. (Repair)	Can be readily burnt to form (Energy)	If sufficient carbohydrate present, can be burnt to form (Energy)

The Lymphatic Type.

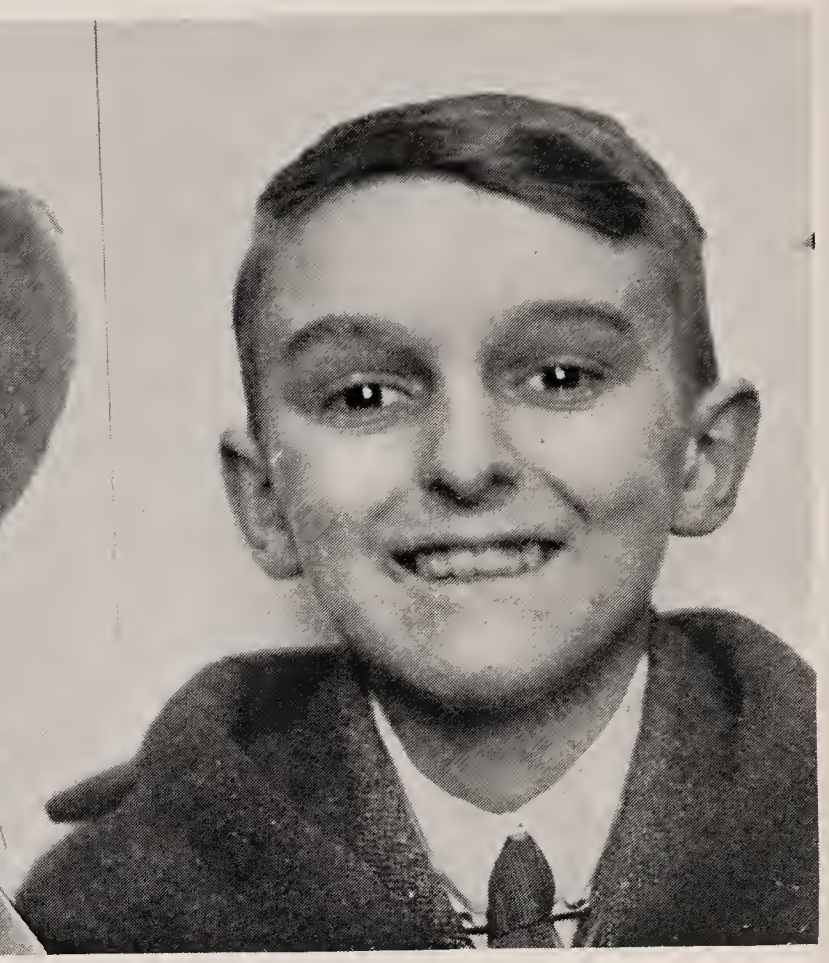
The Lymphatic Type.

The Lymphatic Type.

The Lymphatic Type.

To illustrate Mr. ROBERT CUTLER'S communication.

The Acidotic Type.



The Acidotic Type.

The Acidotic Type.

The Lymphatic Type.

To illustrate Mr. ROBERT CUTLER'S communication.

In an acidotic child with its rapid reactions, the sugar energy reserves tend to be quickly diminished, more especially if the parents restrict carbohydrate (sometimes on their dentist's advice). Then the following may result :—

Protein.	*Carbohydrate.*	*Fats.*
As before.	Quickly used up.	Insufficient carbohydrate left, to ensure normal metabolism of fats; intermediate toxic bodies formed, acid in reaction.

Clinical Symptoms of Acidosis.—Pallor, irritability in mornings, muscle weakness (resulting in postural defects, with pain in legs and back of neck), abdominal pain, sickness, and smell of acetone in breath in severe cases, whilst the Rothera test in the urine is positive.

(Comparative photographs of acidotic and lymphatic children were then shown, and then two patients were brought forward for inspection illustrative of either type ; the mothers also kindly consented to appear before the meeting, and these showed the hereditary nature of the tendency to abnormality.)

And now, from all that has gone before, I must formulate a very comprehensive conclusion which comprises the whole burden of my remarks to-night. It is *that the lymphatic type of child characterised by a tendency to tissue waterlogging, and by low resistance to infection, manifests coequal with many other stigmata, a tendency to have jaw defects, characterised by mandibular shortening and postnormality, with maxillary narrowing and protrusion.* Also *that the acidotic type, with its unstable carbohydrate metabolism, will usually have jaws in normal relationship, but possibly with simple and complex irregularities due to crowding.* Thirdly, that the normal child, and for that matter the acidotic type as well, *may* develop one or all of the protrusion defects, *but only as a result of bad habits, certain local factors, or by factors of dental heredity, and so on.*

Such, then, are my general conclusions, based purely upon clinical and orthodontic observation, but in a mild way I would also try to satisfy those who clamour for statistics, though in this connection I would have you bear in mind Disraeli, who, when pressed for figures by the Governors of the Bank of England regarding the purchase of the Suez Canal, told them he could, if need be, make his statistics prove anything !

Firstly, it would be well to enunciate the typical features of the jaw characteristic in a subject showing marked lymphatism.

Maxilla.—(1) Narrowed arch, *especially in the intercanine region.* (2) A tendency for the vault to be high. (3) A tendency for the twelve-year molars to erupt in a normal cross-maxillary width.

Mandible.—(1) The total antero-posterior length tends to be subnormal. (2) The existence of "post-normality." (3) Diminished vertical growth in the molar region. (4) Uprising of incisor alveolus causing excessive incisor overbite.

(This is, of course, almost the identical picture painted by Sim Wallace of his conception of the typical Class 2 jaw, a fact not without interest in that this worker stresses the significance of the "soft sloppy diet" as the main causal factor of the deformity ; *in so far as "soft sloppy diets" are essentially carbohydrate in nature*, it is obvious that his view in its entirety can now be challenged on scientific grounds.)

In the children's department of the Dental School of Guy's Hospital, conducted under Mr. F. B. Bull's directorship, some four hundred *essentially English* children are enjoying active orthodontic treatment,

and over these the Registrars (Messrs. Cutler and Rix) exercise supervisionary care. From the former's group of approximately two hundred cases, were extracted every example which exactly conformed to the type-characteristic above described.

The mode of investigation was as follows: during a two-year period from January, 1929, to January, 1931, approximately two hundred children commenced and were still under active treatment; all cases of "protruding upper teeth" (patients' symptom) and "Class 2, Div. 1" (official classification) were then segregated, and of these (approximately ninety in number), sixty remained when the final test of type deformity, before described, was applied. During the normal routine working of the department, further details of these children were secured by means of notes in chart form which were appended to the Registrar's duplicate case treatment reports (examples were shown on the screen).

Number :
Name :
Age :

Intelligence { Bright. / Normal. / Dull. } Judged by personality response, conversation, care and use of apparatus, etc.

Diathesis { Markedly Acidotic Type. / Not grossly Abnormal. / Definitely Lymphatic. } Judged by clinical examination and by simple chemical and bio-chemical tests.

Colour Type { Dark. / Auburn. / Fair. }

Many interesting points were discovered (shown on screen), but the following percentages are noteworthy and should be set on record :—

53 per cent. were considered not grossly abnormal.
47 per cent. showed marked evidence of lymphatism.
0 per cent. *there were no cases of acidotic type.*
70 per cent. were fair or auburn-haired.
30 per cent. were dark-haired.

Such, then, is my interpretation of one of the greatest problems of etiology which at present confronts us; and as practical orthodontists you must now inevitably be wondering how such conclusions—if correct—can be applied to our own work. Logically, we must first follow the realisation that we cannot, solely by appliances of vulcanite and precious metals, erase completely a manifestation of a general disease; the physician must lead the way, and we as technicians must follow. You might well ask, then, what are the lines upon which the physician conducts treatment.

Sunlight, natural or artificial, is considered a most powerful aid, exposure to ultra-violet radiation being facilitated by scanty clothing in the summer months, when the limbs and chest can be freely exposed to the sun's rays; whilst in the darkness of the winter months the carbon arc has shown its very real value.

Reduction of the carbohydrate intake is very necessary, a high protein and vegetable diet being stressed; while catarrhal infection must be guarded against by appropriate measures. At his discretion the physician employs drug therapy, iron and iodine being mainly employed; Syr. Ferr. Iod. B.P. is a selected standard preparation of this nature, whilst in certain cases the exhibition of thyroid gland in carefully controlled dosage, brings about a welcome improvement, if acting only as a stoker of the metabolic furnace.

Secondly, awareness of the significance of the lymphatic state will

make us take every opportunity to detect, and guard against, the development of this specific deformity from the very earliest time, rather than waiting for it to thrust itself upon our reluctant attention at a later and less tractable age.

Thirdly, appreciation of this conception of disease may vitally influence not only the prognosis, but also the very nature of the orthodontic treatment, so that in such cases extraction and simple appliances may ultimately achieve the most satisfactory result; while disappointment will be avoided if no extravagant promises are made with regard to the probable success in treatment of cases coming into this category.

Well, gentlemen, in this sketchy paper which I lay before you to-night I have made no attempt to discuss the actual mechanism which brings about this typical deformity: work on such matters comes strictly within the purview of the embryologist, the comparative anatomist, and the physiological researchist, and to their findings we must unquestionably adhere. Amateur dabbling in this direction by us can only lead to utter confusion of purpose; rather is our opportunity—as clinicians observing and empirically treating the living organism—to point out to them the line of research, and to indicate the manner in which the various abnormalities appear to be correlated.

The problem of disorderly growth is—like Cerberus of the Underworld—a many-headed monster, one such Heredity, one the Local Factor, one Diet, and so on, and we shall not conquer it by random slashes at such apparently vulnerable points, for as in classic mythology, two more will grow in the place of each one destroyed.

The view that mouth breathing alone is the main cause of this specific deformity is an outworn shibboleth; it is a played-out hack which must vacate the stage, for the scene is set and the audience waiting for greater things. It is abundantly clear that the possibilities of mechanical technique are becoming fully exploited and that we must call the physician, the physiologist, and the clinical researchist to our aid before any real advance can be made. However perfect the results of treatment by expert technicians may be, in the hands of the average practitioner the percentage of failures is sufficiently great to often cause a certain measure of anxiety as to the nature of the result whenever treatment is undertaken. Application of the principles of this new concept of disease will, I firmly believe, not only diminish the percentage of failures, but will relieve us of much of the labour necessitated by prolonged and vigorous treatment.

Mr. President and gentlemen, few will deny the existence of the problem considered to-night, though many may disagree with my own approach to the matter. A man who takes no advice but his own has a fool for his councillor, whilst wisdom dwells in the verdict of the company, so that by discussion other and more promising avenues may be opened up, and so benefit accrue to us all.

Discussion.

Mr. F. N. Doubleday said that he was always reluctant to take part in a discussion on a subject of which he was very ignorant, but he did believe in the correctness of the principle which Mr. Cutler had enunciated, and he would be sorry if a discussion were not initiated. He thought that the whole problem of the general and constitutional condition of the patients whom they treated was one which had been brought forward in recent years more particularly by the study of glandular therapy and by the biochemists in the study of acidosis and alkalosis, the efficiency of mineral salts, and so forth, and that it was of very great importance. His knowledge of the case so far as it affected children was more limited, but from time to time he had in his practice cases of children, many of whom seemed to conform closely to the lymphatic type of which Mr. Cutler had spoken. For some years he had been in the habit of treating them in part by thyroid gland

therapy, and he hoped Mr. Cutler would expatiate a little more widely on that form of treatment in his reply. He had seen patients treated with thyroid gland, in association with physicians who were a little bolder in their treatment than he would care to be, and these patients had developed and overgrown in an alarming manner, and the eruption of the teeth (which was often delayed in this type) had come prominently forward and been exaggerated. Nowadays, he thought, one attached greater importance to the balance of diet than was the case some years ago.

Only that morning he had received a report from the out-patient department at Guy's Hospital which had a bearing on the present discussion. A patient was referred to him by a doctor on January 19th in the belief that he had a neuritis of toxic origin due to dental infection. The patient was sent to the out-patient department at Guy's for the treatment of the teeth. Clinically and radiographically, very little evidence was afforded of anything wrong, but the teeth did show an unusual type of erosion or wear which made him think that the patient was a man of the acidotic type. An investigation of the pH of the saliva was carried out. He had heard it said that the pH of the saliva as carried out by dentists was untrustworthy, because the conditions were constantly and rapidly changing. But in this case an acid saliva was found, and to confirm the finding the case was sent to the pathological department, where it was found that the man had 6.2 pH of saliva and 5.2 of urine, evidently much on the acid side. In view of this finding, he was referred to the physicians of the out-patient department, who said that he was suffering from general acidosis, to which the neuritis was attributable. Therefore, although sent to the department originally for the treatment of his teeth, the result of the investigation was that he would undergo a general treatment for acidosis.

Mr. Cale Matthews said that unfortunately he was rather late in arriving at the meeting, and he failed to hear the opening remarks of the author. Possibly he had missed the author's definition of the lymphatic condition. It seemed to him that he had built up a thesis which in one sense might contradict itself. One recognised the type of child; one did not always recognise the condition. From his own clinical experience, he could not agree with the author in what he understood him to convey, that every child with a post-normal occlusion should be regarded as potentially a lymphatic. Further, when it came to the point of treatment, he could not follow the author's idea. He had certainly paid a tribute in the latter part of his paper to the value of orthodontic technique in the treatment of these cases, and that was a point in which, the speaker felt, we in this country were lamentably behind. He thought the paper was extraordinarily interesting; certainly it was interesting to himself, because he was avidly looking for evidence on all these points of diagnosis for very special purposes almost immediately. He was not, however, at the moment prepared to discuss the paper on any scientific basis. On one point a note of warning might rightly be sounded. He thought that dental surgeons might have some primary responsibility for the condition of acidosis. They had preached for years now the withholding of sugar from the diet in many cases, but they had laid this down only in a very empirical manner, and the effects of such withholding might be, he felt sure, disastrous. Unfortunately, he had not been able to hear the discussion which took place in the Odontological Section of the Royal Society of Medicine a week previously, but he had read the paper given on that occasion. In his own experience and in that of many others, this condition of acidosis had led to sea-sickness and similar maladies, and he had conclusively proved to his own satisfaction that the giving of sugar not only would prevent *mal de mer*, but even in the midst of an attack it would hold it up and conquer it. Therefore the question of the withholding of sugar was a very serious matter in regard to young children, and he thought that dentists should be very careful in their own speciality in the warnings they gave as to the use of sugar. It should only be a certain type of sugar that should be withheld, such forms, namely, as were so extremely sticky that they might damage the dental work which had been done. Sugar should not be withheld in its entirety. He expressed his extreme appreciation of the paper.

Mr. H. E. Marsh said that whilst thanking Mr. Cutler for his very interesting paper, he would like to ask him whether it was possible for the condition of acidosis to co-exist with or supervene very rapidly upon the lymphatic condition. He had in mind a girl whom he had known for many years who exhibited some of the lymphatic characteristics which the author had described. He would say that she very well exemplified what Mr. Cutler had called the waterlogged condition which he had so aptly described. This girl, too, had a lack of eyebrow, and also had the "ironed-out" appearance of the bridge of the nose, and the fold in the chin. None the less, she had normal occlusion, and so far from being dull, she was very intelligent and extremely sensitive—so sensitive, indeed, that she got her parents to change their medical attendant because, in his attempt to be cheery

and bright with the child, he had on one occasion called her "Fatty." She had exhibited many of the characteristics seen in acidosis. He believed she might be the subject of thyroid deficiency, or, on the other hand, of too much thyroid—he knew very little about glandular conditions, and he was not sure whether it was thyroid deficiency or too much thyroid which might be the cause of the overgrowth of the soft tissues of the body. But what he wanted to ask was whether the two conditions which the author had described must necessarily be opposed to one another, whether the one must exclude the other, or whether the acidotic condition could supervene upon or arise in a lymphatic condition in the young subject.

Mr. A. L. Packham wished to thank the author for his paper, which, in his opinion, marked a new era in the study of orthodontics. It fell to his lot to see a good many children in the orthodontic department of the Royal Dental Hospital. He thought that he could from memory fairly substantiate the author's experience that a large percentage of the children suffering from post-normal occlusion did also suffer from the lymphatic state. The difficulty, perhaps, in getting members to discuss this paper [there had been a lull during which the President called in vain for further discussion] was due to the fact that it came rather as a shock to them, and one would like to be accurate in making such a statement as that. But substantially he could, from his own experience, support the author's remarks. He thought that those members who were also members of the Odontological Section of the Royal Society of Medicine had been fortunate within the last week in hearing, first of all Dr. Osman the previous Monday, who read a most instructive paper, directed mainly towards the acidotic state, while that evening, in this Society, they had listened to another paper directed mainly towards the lymphatic state. There was one further remark he would like to make. It was within the experience of all who had tried to do orthodontic work, that some cases would almost correct themselves, and others, despite all their best endeavours, would not respond to treatment. It might be that if they had looked at these cases from the point of view which the author had suggested that evening, the failures would have been fewer. He thanked Mr. Cutler very heartily for his paper, which must have entailed very many hours of labour in its preparation.

Mrs. Lindsay said that she was very reluctant to speak, but she could not help feeling that the author had selected his cases. All the children with post-normal occlusion were not lymphatic; as was well known, many very bright acidotic children had mouths showing post-normal occlusion. On the other hand, many lymphatic children had quite normal occlusion. She had been acquainted with a child who was of the lymphatic type up to about the age of 12, but she had a perfectly normal occlusion. She was very fat, very pale; to use Mr. Cutler's expression, she was "waterlogged." Then, at that age, she changed over and became very vivacious and quite of the opposite type. She had known children of the acidotic type frequently given to sickness while travelling in trams and trains or when under any excitement, but these children absolutely loathed sugar, and would not take it on any consideration, and they had grown up to be perfectly strong and normal individuals. She thought that it was a pity to dogmatise on these lines. They would remember Kingsley's description of the post-normal child. The child with the V-shaped arch was ranked as the highly-intelligent child. She thought it was Sir Charles Tomes who said the opposite, that such children were dull, almost idiotic, and there was a German who had a whole gamut from the dull to the highly intelligent, from the V-shaped arch to the broad arch. It seemed to follow that one could find almost anything one was looking for in these cases, and therefore she thought it was a pity to select them in the way that Mr. Cutler had done. Of course, he had done it very cleverly; he had fitted all his cases into their intended grooves, but those who had to attend and treat these children must take them as they came, and not dogmatise in this manner. She wished to add, however, that she had much appreciated and enjoyed the paper, and she thought it a very valuable contribution to the study of orthodontics.

The President (Mr. A. T. Pitts) said that the paper was full of points of great interest. It was one of those papers which it would not be possible to discuss adequately on a first hearing. But there were certain points which presented themselves and might be brought forward. This was an age in which there was a passion for putting people into pigeon-holes, and a tendency to split up the population according to certain physical or mental characteristics. There was no doubt that the broad classification of physical types which Dr. Hector Cameron had laid down was borne out by general experience. But having formulated a type like that, one had an almost unconscious bias towards making the picture distinct, rounding it off and defining the outlines, as a painter might do. The result was that these particular types seemed to become more and more sharply

cut so as to seize and interest the imagination, and he thought that sometimes in the end the classification rather tended to defeat itself. From the standpoint of orthodontists it would be rather a disastrous thing if one generalised backwards from the occlusion, and assumed that the various patients with whom they had to do possessed on this account certain physical or mental characteristics. It would be, indeed, an alarming possibility if a post-normal occlusion came to be regarded as the essential requisite for the future father of a healthy family. Suppose the State were to require a physical examination as a necessity before marriage, and orthodontists were to be called in to take models, and issue, on the basis of the occlusion, a State certificate to the effect that marriage might be sanctioned! The serious question would then arise as to the unfortunate individual with pre-normal occlusion. He rather gathered that perhaps it might be a fair way of putting the case to say that this particular lymphatic type undoubtedly held good of a section of the child population in whom it was often associated with certain dental defects, particularly post-normal occlusion, but that one must not say, conversely, that a case of post-normal occlusion with maxillary protrusion was therefore an example of lymphatism. If one went so far as to say that, one would probably fall into a grave error. But a certain percentage of cases of post-normal occlusion were actually examples of the lymphatic diathesis. That might have quite an important bearing on the prognosis. Everybody who had treated cases of malocclusion for many years acquired a certain prognostic instinct for sizing up those cases which were going to react well and those which were not. With regard to some cases, he felt quite sure that, although he could move teeth here or there, nothing was going to make them remain as they should, and it was possible that the present paper might furnish a certain clue as to what lay behind such cases. Possibly in this type of case, in which the treatment might not be very successful, one might imitate the author and carry out treatment of a very simple type, correcting the superior protrusion and leaving the lower jaw alone.

A point which had struck him was that the well-marked clinical entities in malocclusion were particularly common in hospital, and not quite so common in private practice. At the last meeting of the Society he had raised the question as to whether there might be a social grading of malocclusion, and he suggested, without committing himself, that open-bite might show an example of this; the subsequent discussion rather bore out this view. He was rather inclined to think that extreme cases of malocclusion, such as post-normal occlusion, were undoubtedly commoner in hospital practice than in private practice, and that the author's conclusions as to the percentage of post-normal cases showing lymphatism would probably be smaller in private practice. He would like to see someone with the experience of Mr. Visick undertaking an investigation on this point. Mr. Visick had the opportunity at Eastbourne of seeing private cases in good schools—coming from good families—and he would like him to take his post-normal cases and to see how many of them could fairly be fitted into the classification which the author had described. Perhaps at some future meeting Mr. Visick might be able to offer a short communication bearing on that point; other members with exceptional experience might also be able to do the same. Seeing that a good deal of the data had to be obtained from hospital practice, it was rather desirable that the impressions derived from such data should be corrected by those derived from experience of children in a different social position, so as to make quite sure that the conclusions were valid. He thought that the Society was most deeply indebted to Mr. Cutler for his very stimulating paper, for which, in the name of the Society, he offered him their best thanks.

Mr. F. St. J. Steadman supported Mrs. Lindsay's remarks to the effect that extreme caution should be exercised before accepting the view that post-normal occlusion was more common in the lymphatic type of case than in others. Looking back on the cases he had had to deal with he would not be inclined to agree that they bore out Mr. Cutler's teaching. He hesitated about saying anything more definite, as he could only speak from guesswork, and had no actual figures, but his impression was that this type of case did not bear out Mr. Cutler's doctrine that post-normal occlusion was more common in this type. In fact, he had the impression that the dentures in this type were on the whole as good as those seen in any other class of children, but of course it would be necessary to take a large number of these children and examine them carefully before making any hard-and-fast statement. For many years he had been dental surgeon to the West London Hospital, and he *had* noticed that in this so-called lymphatic type of children ethyl chloride was particularly dangerous as an anæsthetic unless given with very great care. He had seen several dangerous conditions arise under this anæsthesia.

Mr. R. Ernest Rix asked whether Mr. Cutler would be prepared, in considering the two types, to read into them any differences of racial origin. In the one case,

to his own mind, the Nordic type was suggested, and in the other the Latin. The English were obviously themselves a mixed race, and possibly these states were not entirly pathological, but had a racial significance.

Miss RUSSELL, after saying that the paper had furnished much food for thought to orthodontists, asked why, if it was a general physical defect that they were considering, one should start with the local physical defect first of all. Such a procedure seemed futile. Instead of fitting in plates and appliances, the advice of the medical man should first be called in in the case of a lymphatic child who had post-normal occlusion. On the other hand, she doubted whether that was a correct way of reading the truth of the case. She also thought that Mr. Cutler's classification of the auburn type with the fair type was quite wrong. She had always been taught that the auburn type of person was very much nearer the dark type than the fair, and certainly anything but phlegmatic.

Mr. CUTLER, in reply, wished first to remind the members of the chart he had shown, which gave three divisions of cases, namely, the lymphatic, the normal, and the acidotic. He had said that it was a typical manifestation of the lymphatic type to have the characteristics of post-normal occlusion, but he did not exclude the normal child from having them also. They might have arisen from the factors of heredity or early habit. Nor did he necessarily exclude the acidotic type from developing abnormalities. He would never postulate that, just because a child had post-normal occlusion, it was necessarily lymphatic. That would be a ridiculous statement to make. All that he said was that this type of post-normal occlusion which had been considered that evening was a typical manifestation of the lymphatic state coincident and co-equal with many others.

Mr. Doubleday had raised several points. One of these referred to the fascinating subject of glandular therapy. But the administration of ductless gland remedies was about the keenest double-edged weapon that could be imagined. With regard to the thyroid gland, sparseness of the hairs in the outer third of the eyebrow was regarded by physicians as a typical sign of a sub-thyroidic condition occurring in women at the menopause, and that also was seen in the lymphatic condition. As he had stated, lymphatism did respond to doses of commercial preparations of thyroid gland. He was interested to hear that Mr. Doubleday found that children grew very rapidly when thyroid was administered. That was true to some extent, but he always conceived of the thyroid gland as being a katabolic agent, and, as it were, stoking up the tissues. What were the clinical symptoms of hyperthyroidism? Loss of weight, restlessness, excitability, nervousness—all these were characteristics of hyperthyroidism, and he always looked upon the thyroid as having rather a mechanical action in the treatment of the truly lymphatic type in that it stoked up the body furnace, though no doubt there was a deeper action as well.

In reply to Mr. Cale Matthews, he would repeat that he held that this particular type of post-normal occlusion *was* a manifestation of lymphatism. As to sugar-withholding, what Mr. Matthews had said was true with regard to children of the acidotic type deprived of sugar, but harmful results could equally be got by means of a too-fat diet. The mother of such children, noticing that they were pale and thin, was inclined to give them a fat diet, with plenty of country butter and grade A milk, and so there came about an excess of fat. These children were in a state of chronic acidosis, and by virtue of that condition are most insusceptible to treatment. Such children were inclined to cry, to get annoyed, and to have fits of passion. If, however, their diet were altered, and the fat cut down, their demeanour changed, and they became good-tempered and amenable to dental treatment. He remembered a child seen at Guy's who was very sick while the dresser was taking impressions. The dresser said to him that he feared his impression-taking must be very bad to have that effect on the child. On examining the child he noticed that she had a most marked smell of acetone in the breath, and on altering the diet, cutting down the fats, and pushing on the carbohydrates, she became altogether different, and the orthodontic treatment went smoothly. Therefore, the point raised by Mr. Cale Matthews was of practical importance to those who undertook treatment.

Mr. Marsh had asked whether an acidosis could supervene on the lymphatic state. There were three groups of children, and the greater number were in the more-or-less normal group. By feeding a normal child on a heavy carbohydrate diet one could eventually produce some of the features of lymphatism, and if a normal healthy child were taken and made to do a lot of exercises, and the sugars in the diet were cut down, he might show signs of acidosis more quickly than an adult. But that was not to say that the child was an acidotic child. The case cited by Mr. Marsh might be regarded as more or less normal in type, but possibly influenced by such conditions of environment and diet as for the time to show

some signs of lymphatism. Later, owing to the lack of sugar, or to pushing up the fats, the condition of acidosis might develop. That was the interpretation he himself would put upon the apparent contradiction. The cases were not necessarily opposed to one another.

Mr. Packham had said that some cases seemed from the first to go badly. That was true, and it was one of the things which had put him on to this conception which he had brought before the Society that evening, that if one applied a more or less standardised treatment to the needs of children in the children's department, certain interesting results were to be obtained. Certainly it was found, on looking through the confidential case reports, that some children reacted very readily, while others obstinately refused to go well. That was one of the first things which put him on to this line of investigation.

Mrs. Lindsay had rather suggested that he had selected his cases. He had taken, as he had stated, a series of two hundred cases; he had taken every case in that series. The case register was open to the inspection of anyone at Guy's, and it was possible to examine the models of all those which had this typical condition and no other. Every model, he thought, barring one or two, showed the typical condition, as like as peas in a pod, and all the cases in his list had precisely the same dental deformity. He had tried to get out of any selection by saying that in his list he considered 50 per cent. of the cases not markedly abnormal. Some of them, he thought, had a lymphatic tendency, but nevertheless, he had included them in the normal. Then Mrs. Lindsay had put a point that every child with post-normal occlusion was not necessarily lymphatic. But it was not his point at all to say that every child was. Mrs. Lindsay had also made reference to the waterlogged condition as though it meant the same as being very fat. But one could get a fat child who was not waterlogged. Take the case of the Froehlich syndrome, the anterior pituitary lobe type, and one had at once the "fat boy of Peckham." This boy was not waterlogged, he was fat. The waterlogged type of child was one who could be rapidly reduced in weight by thyroid medication. The fat, not waterlogged, children had flesh which consisted of the normal body tissues, not with any excess of water. That a child was fat did not necessarily mean that the child was waterlogged. Then Mrs. Lindsay said that it was a pity to dogmatise. But as practical orthodontists they had to take up some definite line in some way or other. The argument against them had been that they had a "hit and miss" method. Therefore he thought that a certain dogmatism must be permitted. One should try and divide cases into groups which could be treated by different methods. He considered that dogmatism was of very great value.

The President had spoken of pigeon-holing, and that point bore on prognosis. If he "sensed" a lymphatic type in a child, he had a suspicion that that case would not go too well. With a lymphatic child aged, say 11, he would not dream of trying to deal with the lower jaw by intermaxillary traction, save in the most exceptional conditions; he would try a less radical procedure.

Mr. Steadman rather supported Mrs. Lindsay, and therefore his remarks in reply to her would apply also to the points Mr. Steadman had raised.

Mr. Rix had touched on the question of racial origin, but the speaker had merely based what he had brought forward that evening on clinical observation of English children, with an admixture of Jewish children. It might be asked, What was the percentage of Jewish children who were dark? He did not know at all. That was an instance of how racial characteristics might come into the picture. But he was just dealing with the results of his own investigation of normal English children, and had tried to show how such a study might help the orthodontist materially in his work.

As to the question of auburn children being nearer the dark variety, that might be so or might not. He always found that it was easier to draw the line between the dark child and the auburn child than to draw it between the auburn child and the fair child. A child was either dark or not dark, as a rule, but there might be considerable difference of opinion as to whether a child was fair or auburn. In photographs one could not tell whether a child was fair or auburn, but one could tell whether the child was dark or fair, provided, of course, the photographs had been properly developed and not faked. In his own department the development proceeded under standardised conditions, but it was possible, if one so minded, to make dark children in a photograph appear fair, or fair children appear dark. His own photographs were taken in studios under a standardised technique. The reason why he had classed auburn with fair was because he felt he could get them together, and detect the difference between black and auburn better than he could detect the difference between auburn and fair.

A vote of thanks was proposed from the chair and accorded to Mr. Cutler, and the meeting then terminated.

CHANGES IN THE BONE OF THE MANDIBLE AND THE TEMPORO-MANDIBULAR JOINT INCIDENT TO THE APPLICATION OF ORTHODONTIC APPLIANCES.—SUGGESTION AS TO THE ETIOLOGY OF INFERIOR PROTUSION.*

By Mrs. Lilian Lindsay, L.D.S.

About two years ago Mr. G. Northcroft remarked with his wonted emphasis that it annoyed him to hear the cause of an anomaly ascribed to heredity, for it was obvious that when an anomaly was handed down to posterity there must have been some reason for its appearance in the original ancestor. Again, Mr. Northcroft suggested about a year ago that references to continental literature bearing upon orthodontics might be printed on the billets calling the meetings of this society. Therefore Mr. Northcroft may be considered as the origin of this anomalous discourse. Now, the search into the etiology of an irregularity in man, necessitates an excavation into the past, for man's genealogical tree has its roots deep down in antiquity; and tempting though it may be to dig as deeply as the three great apes—the progenitors of the three types of man: the gorilla or acidotic, the ourang or lymphatic, and the chimpanzee, the mean between these two extremes; tempting as I say it may be, I will leave that to younger fellow-workers of the soil, and only disturb the surface covering the races represented by the long heads and the broad heads.

Dr. Lukomsky,[1] of Moscow, studying the prehistoric grave finds in Russia, states that he found there evidences of a pure or unmixed race whose skulls show no signs of irregularity, caries or pyorrhœa—which might suggest to some of us that the Garden of Eden might after all have been planted in the frozen soil of Russia. The trouble arose when the two races mixed, for although the Mendelian law demands that a certain number of the offspring should possess harmonious upper and lower jaws, the rest would have long narrow uppers and short lowers, or short upper jaws and long narrow lower jaws. The permutations possible to these two combinations are sufficiently numerous to delight even the modern orthodontist.

Drs. Sicher and Krasa[2] made similar observations when examining the skulls in the Vienna Museum, the results of which examination they published in 1920-22. (Figs. 1 and 2). They measured the skulls and worked out the results. You will see here that one of the facts discovered was that in post-normal occlusion the angle which the ascending ramus makes with the body of the jaw is a right angle, which is regarded as correct for the finished or adult angle, while that obtaining in the pre-normal is obtuse or that which is considered as the angle of the infantile or senile jaw. At the end of this investigation Drs. Sicher and Krasa came to the conclusion that the lower jaw is responsible for all the trouble—that is that it shows an individuality and an independence unique among the bones of the body. This fact was pointed out many years ago by Dr. Sim Wallace, who has always held that the lower jaw moulds the upper jaw.

You are all aware of Oppenheim's[3] experiments; the figures have often been used in papers before this society. Oppenheim was the first to attract attention to the transformation which might take place in the tissues surrounding the teeth as a result of orthodontic measures. He showed that when teeth were moved in certain directions definite changes took place in the alveolar bone, deposition on the tension side and absorption on the pressure side following regularly, according to well-known laws of bone growth and architecture.

* *Transactions* of British Society for the Study of Orthodontics.

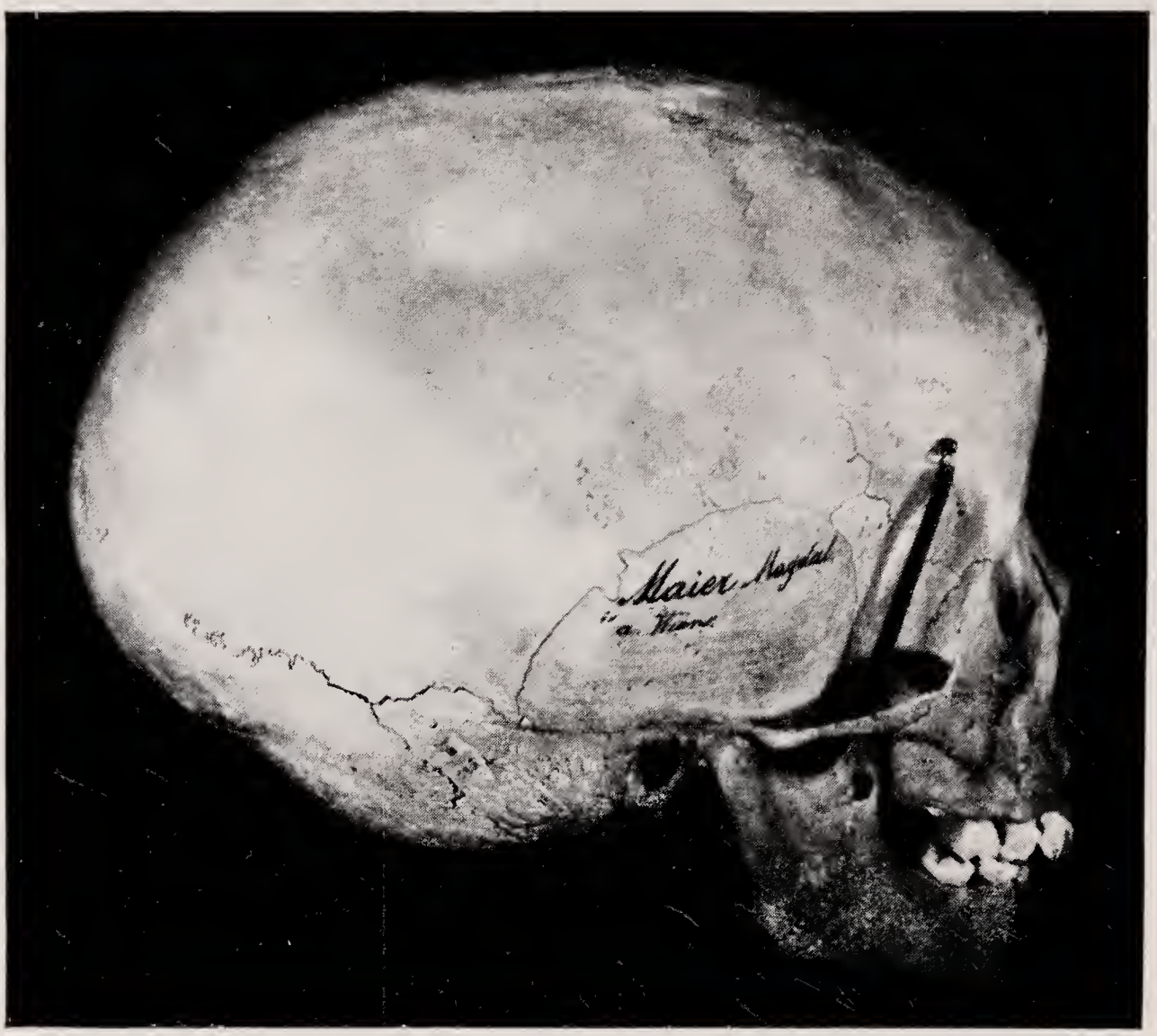


Fig. 1.

Fig. 2.

But these observations were confined to the bone in immediate contiguity to the tooth or teeth to which the force was applied, and now it has occurred to Carl Breitner,[4] of Vienna, to discover whether the rest of the jaw may not be affected as well as the sockets of the teeth. His first experiments were conducted in order to study the changes that take place during an alteration of the mesiodistal relations of the upper and lower jaws, such as those occurring in cases of Angle Class II and Class III.

The experiment was confined to a supposed Angle Class II, which was treated by intermaxillary traction by means of rubber bands to act *en bloc* to bring the lower jaw into a more mesial position.

In such a case there are various ways in which the relations between the two jaws might be altered : (Fig. 3.)

(1) The upper teeth may be retracted.
(2) The lower teeth may be pulled forwards :
    (*a*) By displacement of the teeth themselves in the jaw.
    (*b*) By bringing forward the whole lower jaw.
    (*c*) By artificial stimulation of growth of the lower jaw, remoulding the shape of the jaw.
(3) By a combination of these movements.

Rhesus monkeys were used for the experiment because the temporo-mandibular joint, as well as the form of the teeth and the occlusion, in these animals approach most nearly to those of man. It was decided to bring the lower jaw forward *en bloc* by means of metal caps cemented on the teeth from the first molars to the canines on both sides of the lower jaw. To all of these were soldered buccal tubes to receive a labial arch which touched the incisors and was ligatured to them in such a way as to allow the incisors to tilt. By this means all the teeth comprised in this apparatus were operated upon in the same degree of force. To the caps on the molars were soldered hooks, open towards the back.

The same teeth in the upper jaw were fitted with metal caps, with tubes soldered to them to receive a labial arch, which, however, did not touch the incisors. The hooks in the upper jaw were soldered to the arch over the canines, and were open towards the front. Rubber bands cut from rubber dam and attached to the hooks, were used for the traction.

The experiment lasted eighty-two days. The bands were removed at meal-times and changed daily. The animal was muzzled in between to keep it from removing the apparatus. At the end of the experiment the lower jaw was in the position of Angle Class III or that of inferior protrusion.

The histological examination showed the following :

Changes were seen in the glenoid cavity, on the head of the condyle, in the angle of the jaw, and the alveolar process of the mandible. (Fig. 4.) Absorption was marked by osteoclasts on the anterior part of the glenoid cavity and on the head of the condyle, this being the side of pressure, whereas on the tension side, that is, the posterior side, active deposition was seen, the trabeculæ being arranged parallel to the direction of tension, this arrangement, changing in the direction from behind forwards, held until at the anterior part it was finally replaced by absorption seen by the presence of osteoblasts.

The only deduction from this examination is that the glenoid cavity as a whole had moved forwards and that the mandible also as a whole had moved mesially.

These changes were not confined to the bone of the joint and the mandible, the cartilage of the joint was undermined by absorption.

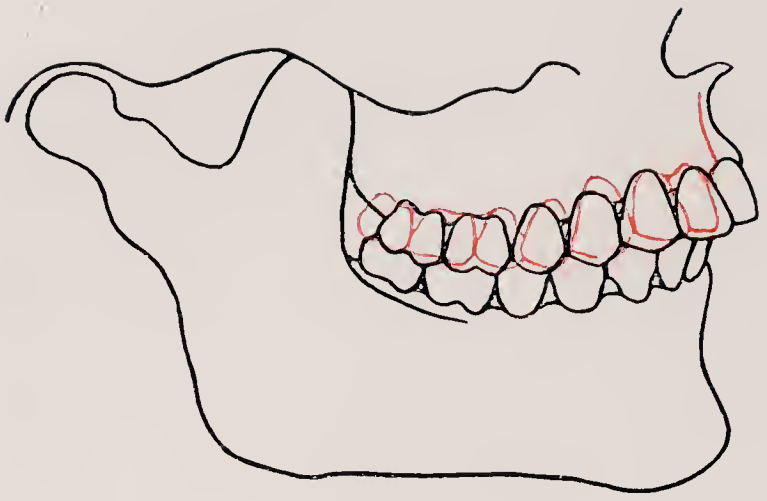


Fig. 1 *a*.

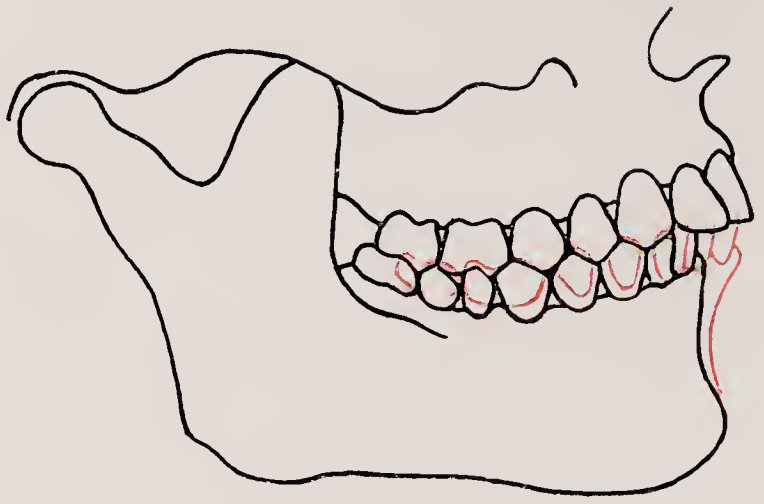


Fig. 1 *b*.

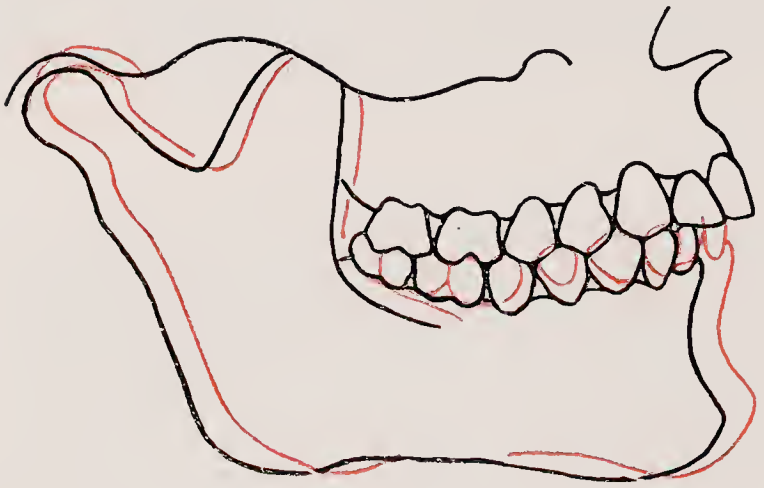


Fig. 1 *c*.

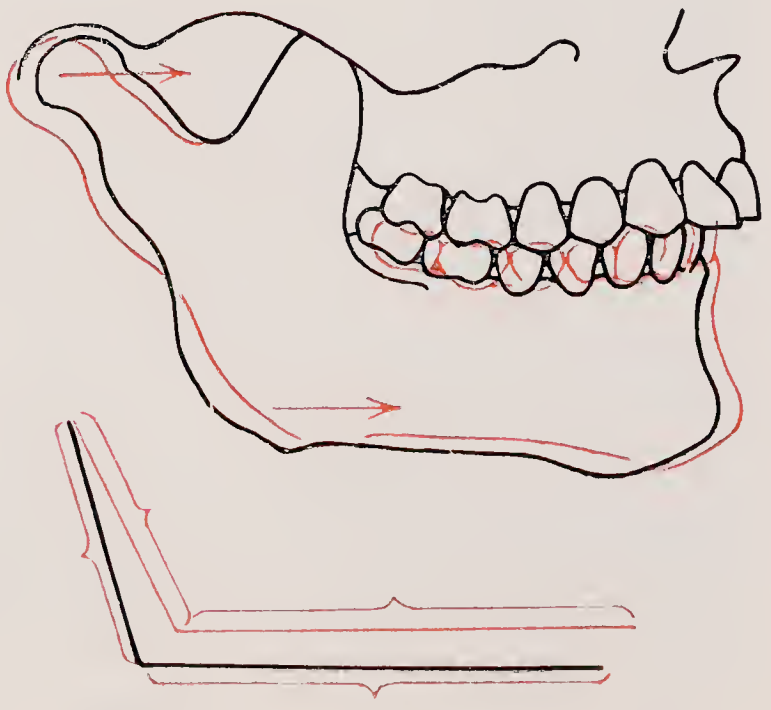


Fig. 1 *d*.

Fig. 3.

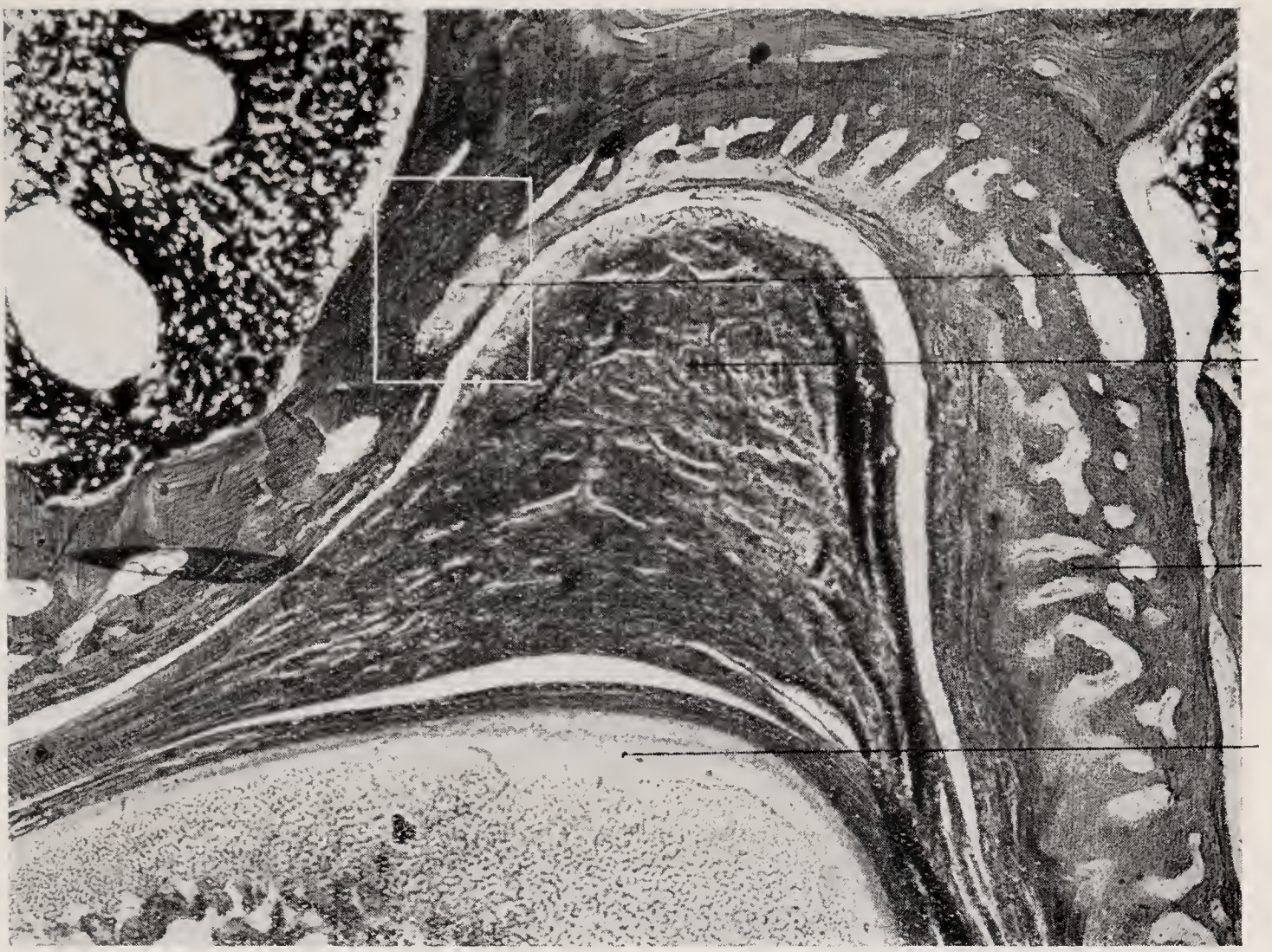


Fig. 4.

Fig . 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

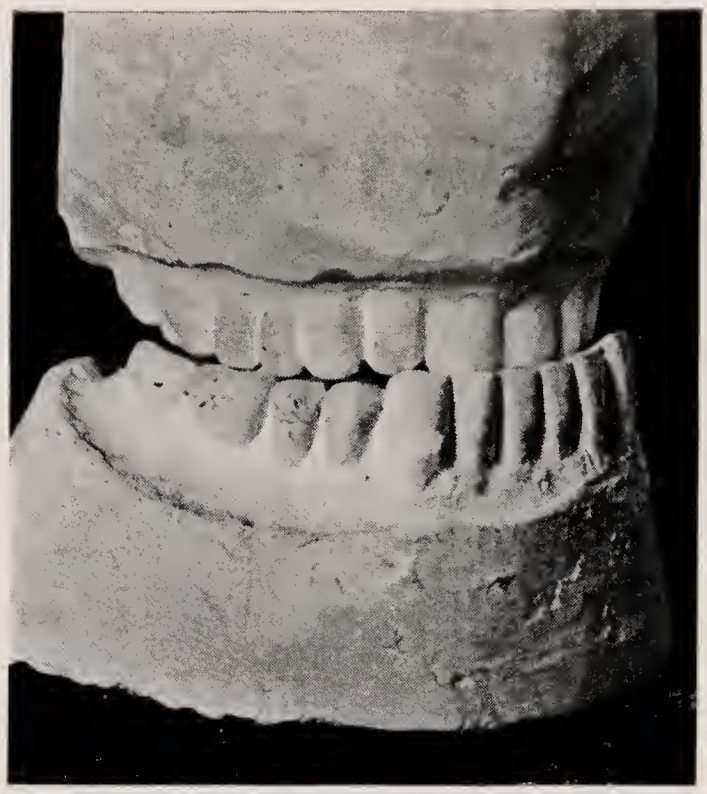


Fig. 9.

Fig. 10.

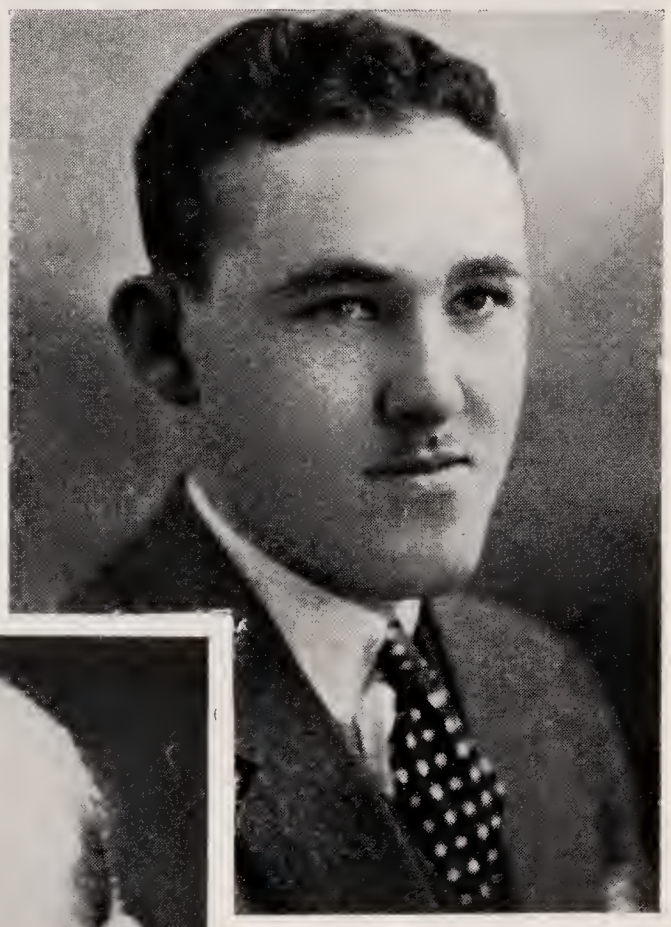


Fig. 10.

Fig. 11.

Fig. 12.

Fig. 12.

Thus although the bone of the head of the condyle was absorbed on its anterior aspect, the size of the condyle was unaltered because bone had been deposited on the posterior aspect.

When the same tissues were examined in the control animal it was found that the bone on the distal side of the condyle ran almost perpendicularly, that is that there was no abnormal absorption, just the ordinary deposition and absorption found in a growing animal. This lengthening of the lower jaw therefore found its expression in the changed relations of the upper and lower rows of teeth. Since the head of the condyle remained in the glenoid cavity, the change must have taken place in the lower row of teeth alone; these had taken up an anterior position due to the change of shape of the mandible, further effected by a remoulding at the angle of the jaw. Here the histological picture showed absorption on the outer side and a flattening or enlargement of the angle as a result of which, the length of the ramus remaining the same, the distance of the ends of the ramus from each other must, necessarily, have increased; the condyle being fixed in the joint, the angle, the other end, must take up a more mesial position.

When the tissues in the vicinity of the capped teeth, that is in the immediate neighbourhood of the application of force, were examined it was seen that changes were taking place there also. The bone trabeculæ of the septa and between the roots of the teeth were oriented parallel to the direction of force; deposition on the mesial or tension side and absorption on the distal or pressure side of the septum.

There emerges from this that the stronger the anchorage the less will the teeth used for anchorage be affected and the longer the force can be permitted to act on the body of the jaw and the joint until correct occlusion is attained.

And now let me direct your attention to a skull (Fig. 6) which has given rise to considerable speculation. It is in the possession of Mr. B. H. Humble,[5] of Glasgow, who has kindly lent it to me for this meeting. It was shown as a casual Communication to the West of Scotland Branch of the British Dental Association last year, with the object of obtaining an explanation of the peculiarity of the angle of the lower jaw (Fig. 7 and Fig. 8), which, as you see, resembles that of the very young or the very old jaw.

I took the skull first of all to Sir Frank Colyer, who first suggested that it was a case of open bite owing to the lack of growth in the molar region; but when he examined it more closely he saw that the lower jaw was almost edge to edge in occlusion. Sir Arthur Keith next saw it and stated that it belonged to a male aged about 20. He said it was an example of the modern tendency in jaws to become narrow and that possibly there had been respiratory trouble.

Now, if we examine the skull in the light of the experiments on the Rhesus monkeys just shown, it will be seen that the lower jaw, which may have started by being in retrusion, has been thrust forward until it has assumed its present relation to the upper jaw; the glenoid cavity is enlarged and there are distinct signs of absorption at the angle and a remoulding of the entire ramus.

I will now pass to the work of Dr. Robin[6] and the condition, which he has called glossoptosis—in which the lower jaw is in retrusion and the tongue in consequence too far back in the pharynx to permit of proper respiration or alimentation, as a result of which the

individual is badly nourished both in the matter of oxygen for the lungs and food for the body. Now, the cure suggested by Dr. Robin is that of orthostatic feeding from birth—that is, to make the infant stretch its mouth upwards and forwards in sucking; in this way the same result is obtained as that from the *en bloc* experiment by Carl Breitner. Now, I suggest that where there is interference with respiration, as there must be in all these cases of inferior retrusion from the position of the lower jaw with relation to the vertebral column, there must be a conscious or unconscious stretching forwards of the lower jaw to obtain relief, and this will of itself bring about the above-described changes.

Another point to note is that changes taking place at the condyle will stimulate growth in length of the whole basal portion of the jaw; for, as Mr. Wilson Charles has pointed out, the condyle is actually an epiphysis for the mandible. This has been corroborated by Schmidhüber[7] in his experiments upon the condyle in puppies.

If you observe cases of inferior protrusion you will notice a certain heavy look about the face as if there had been at some time respiratory trouble. This is particularly so in the case of the Medicis and the Habsburgs, whose familial features gave rise to Mr. Northcroft's remark that there must have been a cause for this anomaly in the ancestor of the line. Last autumn, as my husband and I walked down that long gallery which joins the Uffizi and Pitti palaces in Florence, we noted this fact in the portraits of the Medicis which line the walls. If you look at the portrait of Charles II as a child, to choose only one instance, his adenoidal facies is most marked, and Cosimo III is a glaring case of this.

And now I will show some cases of inherited inferior protrusion—two models and three portraits lent to me by Mr. Macdonald Watson, of Bath, who asked me to present these to the museum of this society on his behalf.

Mrs. Lindsay then exhibited models and photographs from practice, lent her by Mr. Macdonald Watson, of Bath. The portrait of the father and cousin of the younger patient exhibited the lower jaw with typical inferior protrusion. Models of the upper and lower jaws also illustrated the condition. The photograph of the cousin showed that the irregularity was passed on through the female line, as his mother was the sister of the subject of the first photograph. The son of the first patient showed that the abnormality was passed on through the male line as well; it was far worse in him than in the father or the cousin (Figs. 9, 10 and 11, three portraits and models).

Mrs. Lindsay then illustrated a case in which the opposite condition had occurred (Fig. 12). The patient, a soldier, had been out in France, and in September, 1917, had fallen into an improperly-covered shellhole. His comrades had helped him out, and he had not reported sick for the reason that he was going into rest, but went on with his work. He was transferred to the Italian frontier, where he continued to carry wounded for three months. In December his knees began to give out on the march, and he was forced to report sick. He was taken into hospital and his legs were put into splints for synovitis of both knees. Gradually every joint in his body was attacked, so that he became a complete cripple.

The picture showed, not a jaw injury, but simply osteo-arthritis.

His jaw was now in the position of post-normal occlusion. He said that he was progressing very well, but this was an optimistic view, and he was really in a very bad state.

Mrs. Lindsay impressed upon the meeting that she had come to no conclusion. She had only thrown out suggestions. She thanked them for their patience in listening to her.

Discussion.

Mr. G. Northcroft suggested that it would ill become the Society to remain silent after the eloquent discourse which Mrs. Lindsay had delivered. He felt proud that he should have been the "etiological factor" in the production of this paper. The Habsburg jaw, he maintained, was not typical of inferior protrusion at all, but was really a maxillary retrogression. And "heredity" did not explain the original cause of this condition. Mrs. Lindsay, he said, had stressed the appearance in the Habsburg portraits of probable signs of the adenoid face and also of mouth-breathing; the subjects had probably had both enlarged tonsils and adenoids. It had, however, been suggested many times that enlarged adenoids accompanied the lack of development in the maxilla and were not the cause of the lack of development in the antra, which accompanied the small maxilla. The Habsburgs had flattened cheek-bones and very small antra. He thanked Mrs. Lindsay for a stimulating paper; it was extremely interesting to hear of the work that had been done in other countries, and only a scholar like Mrs. Lindsay could translate the works of foreign authors.

Mr. W. A. Bulleid suggested that he might have completely misunderstood Mrs. Lindsay's reference to acromegalic development, but he had understood her to say that she was inclined to attribute the overgrown lower jaw to adenoids and to the fact that the mouth was held open. If he was correct, it was a very curious thing that the underhung jaw was rare and that adenoids and mouth-breathing were extremely common. He hoped that Mrs. Lindsay would correct him if he were in error. The question of heredity interested him immensely. Perhaps "heredity" was an unfortunate word, because many people placed different interpretations upon it, and it might be better to use the word "endogenous" exclusively. Mrs. Lindsay, he said, was undoubtedly correct in stressing the fact that definite deformities did pass from father to son in families—in jaws as well as in other parts. Her evidence would support that view, and many orthodontists could bring whole series of models to show that an Angle Class III would pass down many generations.

Mr. Wilson Charles said that he hardly liked to discuss Mrs. Lindsay's paper without first reading it. Nevertheless, Mrs. Lindsay had very kindly mentioned his work and suggested that he had proved that the cartilage of the lower jaw was in the nature of an epiphysis. He presumed that it might be possible to place this interpretation upon his work on the condyle of the jaw, though it was hardly the interpretation he placed upon it himself. He had seen several references recently to this work; it had been mentioned in a German and an American paper, and the authors had arrived at a conclusion somewhat different from his own. He had always stressed the belief that the cartilage found in the lower jaw was not in any way related to the cartilage which was found in the long bones—for example, the ordinary pre-formed cartilage of the femur. Fawcett and other authors had remarked that cartilage was found in various parts of the mandible—for example, in the region of the coronoid process and of the articulation—and in the opinion of Nicholson this cartilage was nothing more than what he called a "chondroblast" stage. The condyle therefore contained fibroblasts which differentiated into chondroblasts and then into bone cells, or, alternatively, were replaced by them. At any rate this structure, which was definitely not true cartilage, existed. The point of the whole matter was that the lower jaw contained a definite wedge of cartilaginous bone. He showed a slide of the mandible of a fairly young jaw, exhibiting the cartilaginous bone which entered the lower jaw. He remarked that he understood from the works of many writers that they described certain changes which took place around the angle of the jaw. The changes had even been suggested to be due to bending; he asked Mrs. Lindsay

for her opinion about this hypothesis. In one slide which she had shown there was, he said, undoubted absorption. He asked whether these changes were due to absorption or—as nearly all English writers had suggested for many years—to a bending of the bone. Professor Brash had, he said, denied the possibility of interstitial growth. If the bone bent, interstitial growth or interstitial change were absolutely necessary. This demonstration was one of his reasons for showing the slide; another was the clear view it gave of the difference between the two classes of structure. Mr. Charles asked leave to put another question to the speaker. The old conception of mandibular growth was, he said, that the bone was absorbed on the anterior surface of the condyle and deposited at the posterior edge. He had been, he thought, the first person to point out that this did not occur. He emphasised that, in the specimens which Mrs. Lindsay had shown, absorption had taken place on the anterior surface of the condyle, when the whole mandible was brought forward, and also on the posterior edge. This was an abnormal condition. He had demonstrated before in a similar connection that under perfectly normal conditions no pressure took place at the condyle. It was usually considered that the condyle acted as a fulcrum during mastication; this was not so. In the normal condyle bone deposition took place back and front.

Mr. Robert Cutler said that it was fitting to congratulate Mrs. Lindsay on having so ably tackled a subject of such tremendous practical as well as theoretical possibilities. Her paper must inevitably be of great interest to all sections of the Society. He felt that the Society was divided into two main sections. On the one hand there were the older men whose fame and fortune were firmly established and who could afford to browse in the Olympian fields of academic theory and speculation; to such members the paper this evening had a peculiar appeal. On the other hand, the Society contained an ever-increasing section of younger men whose fame, and certainly whose fortune, had yet—if ever—to be made and who were crying out for a lead in the simpler problems of technique in treatment as well. For many reasons there must always be a gulf between these two essential sections of the Society. One reason was, possibly, that veteran specialists had progressed so far in their knowledge and their technique that they possibly no longer fully appreciated the orthodontic growing-pains and the dreadful apprehensions of the young practitioner with no specialist experience who was called upon to take some step in treatment from which there could be no withdrawal. It was the peculiar responsibility of their work that they must go forward to success or to failure, and not, like the prosthetist, make renewed attempts if the first was unsuccessful. To these younger members Mrs. Lindsay's paper brought up an important question of technique in treatment: were there real grounds for believing that post-normality could be permanently corrected in Class II children, say, beyond the age of seven or eight, if so, when and how; and if not, why not? Mrs. Lindsay had very ably postulated the various possibilities that might occur in the successful correction of this condition. He did not desire to elaborate her remarks. There were, indeed, many points of difficulty in the investigation of changes which actually occurred in the jaw; one was the trouble necessary to secure good X-ray pictures of the temporo-mandibular joint. In Class II cases where treatment was commenced early the permanence of the correction suggested that changes must occur in the architecture of the bone or of the joint. In the maturer cases, where treatment was commenced at the age of nine or ten years, a postural slinging forward of the lower jaw must first be established, and he felt that secondary changes occurred in the joint at a later stage, though what these were the eye of no man had seen. He pointed out that Mr. W. Kelsey Fry—one of the most practical members of the profession and a member of the Society—had put on record that in cases cured in this way relapse always occurred when the teeth were removed in their entirety, when the question of dentures was considered. Mr. Cutler adduced one case which illustrated this point. He handed to the President illustrations of a case of a post-normal occlusion occurring in a normal boy with a broad upper inter-canine space and ample room for all his teeth. This was a case from Guy's Hospital, under the directorship of Mr. Bull and exhibited with his permission. Mr. Bull had suggested treating the case by an upper anterior incline to bring the lower jaw forward. This had been employed, but when the excess incisor bite had been lifted the lower jaw had not come forward into its normal position. Films of the lower jaw showed the joint and the occlusion of

the teeth. Afterwards, following up the anterior inclined biting plate, Mr. Cutler had applied inter-maxillary traction for a period of six weeks only; this had established a normal relationship of the jaws, obviously owing to a postural swinging-forward only. After six weeks the boy had been biting forward into the typical Class I position. He had therefore removed the fixed appliance and had put in a simple upper plate with a retention anterior incline. The boy now bit in a normal position either with or without the plate; far more important, he bit and held his jaw in that position when he was not being observed. On Friday last further X-rays had been taken which showed, on the right side, that the occlusion of the molar teeth was now normal and that post-abnormality had been corrected; also that the head of the condyle was now not fully bedded into the temporo-mandibular joint, but was pressed hard against the posterior aspect of the eminentia. The X-rays showed precisely the same condition on the left side. This case opened a question of technique in treatment: whether the case was going to relapse. He asked for Mrs. Lindsay's views on whether a change in the architecture of the bone, which would bring about a permanent result, was likely to take place.

Mr. Bull inquired how much reliance Mrs. Lindsay placed upon the old engravings she had described; considering the furore that was raging at the present time round the Earl Haig statue and its artist, this was rather an important factor. Many of these pictures had simply been made for the benefit of the individual who was painted; they might not be quite accurate representations. He could not well imagine how anybody could wish to have such ugly representations of himself handed down to posterity.

Mr. H. G. Watkin added his thanks to Mrs. Lindsay for what he described as a particularly excellent paper. It had especially interested him because he had treated a case of inferior protrusion some eighteen months ago. Surgical means seemed to be the only practical ones. The patient—whom he had treated in collaboration with Mr. Simpson—had written to him three weeks before in complimentary terms and had announced that he was about to get married.

The President expressed his appreciation of Mrs. Lindsay's paper, which raised many questions of great interest. In making accessible to them the work of foreign authors of whom they could not always know because they did not possess her linguistic ability, she had done them a very great service. Her paper had been divided into two sections: the possibility of bone change, particularly applicable to post-normal occlusion, and the extremely interesting problem of inferior protrusion. With regard to the first question: the changes that might occur when the jaw was advanced; this was one of perennial interest. Mr. Cutler's X-ray films had been distinctly disappointing. It was undoubted that, when an inclined plane had been put in and the bite had come forward, the condyle appeared to be in the glenoid cavity, when the teeth were in contact. It was equally true that, before treatment is commenced, when the mandible is advanced so that the teeth are in normal occlusion, the condyle rests on the eminentia articularis. Some change must occur, and the President had always assumed that it must be some change of bone growth in the ascending ramus, conceivably due to bending. However, as Mr. Cutler said, the X-rays did not seem to bear out that contention, because they seemed to show that the condyle was permanently advanced. It was a little doubtful whether permanent changes occurred in the bone, because relapse could occur. One of his patients, the daughter of a doctor, had given a particularly clear description of the treatment which had been applied to her, and there had been no doubt that she had used an inclined plane for post-normal occlusion. She had worn it for some years. She had informed the President that the treatment had been quite successful, but when he had seen her, she had lost many teeth and the jaw had returned to the post-normal position. She had told him that the whole bite had relapsed when she had had her first baby. That being so, it seemed to him difficult to imagine that permanent changes could occur. Mr. W. H. Dolamore had suggested some years ago that changes might occur in the ligaments, rather than in the bone. He had, he said, been very interested by Mrs. Lindsay's remarks about the work of Robin. He had read many papers by this author, and had not always found it easy to understand what he was driving at, but his work seemed to provide a long-sought picture of the etiology of post-normal occlusion and to show the conditions that might occur before eruption

of the teeth. The President had inquired of many pediatricians, but none had seen children who choked if laid on their backs, as was said to occur in this condition of glossoptosis. He had read a paper in the *Acta Scandinavica Paediatrica* by an authority who described cases of hypoplasia of the mandible in children who had choking fits when laid on their backs, and the pictures showed what was undoubtedly mandibular retrusion; they were, however, all examples of cleft palate. Writers in America had described cases in one of which actual suffocation had occurred, the post-mortem showing mandibular retrusion. The view had been expressed that post-normal occlusion or mandibular retrusion was not necessarily bound up with the condition of cleft palate but was an independent anomaly. He had seen a large number of babies with cleft palate but had never been able to observe that they had mandibular retrusion. They were still far from any solution of the etiology of inferior protrusion. It was all very well to say that heredity did not explain the condition but the fact remained that it was one of the few types of irregularities of the teeth which were perpetuated, and perhaps an explanation could be found in the Mendelian theory. Professor Cunningham had read a paper some years ago on heredity, and Dr. Cockayne had attended and shown a large number of slides of irregularities of the teeth and jaw which had been definitely propagated. According to the Mendelian view, it was definitely not a sex-linked condition, but he agreed with Mr. Northcroft that in some of these recorded cases confusion had probably occurred in the interpretation of the picture, and they had been assumed to be real cases of inferior protrusion, when in reality some of them were examples of maxillary retrusion. Some of the pictures that had been shown that evening removed any doubt that the condition was a maxillary retrusion and not a true inferior protrusion. Professor Bolk of Amsterdam, in the course of some lectures delivered in this country some years ago, had dealt with the question of endocrine glands in evolution; he had pointed out that in the chimpanzee the fœtal condition was orthognathism and that prognathism only developed later, and had suggested that the latter condition was due to the development of the pituitary body. He had put forward the hypothesis that the evolution of the anthropoid apes was conditioned by endocrine activity, and that the same position occurred in man after birth that was a fœtal and transitory condition in the anthropoids. This suggestion raised the interesting question—which was probably supported by other evidence—that definite cases of inferior protrusion were caused by some over-activity of the pituitary body. He was not prepared to say whether they could go further and maintain that some cases of under-development of either the upper or of the lower jaw were associated with an under-activity of the pituitary body, but the point made by Professor Bolk was certainly an interesting one.

Mrs. Lindsay, in reply, thanked the meeting and especially the speakers for their kind reception of her paper and the compliments they had passed upon it. She found that replying was much more nervous work than the delivery of the paper.

Mr. Northcroft, she said, had made some complimentary remarks about her address, and it was owing to him that she had given it. She had tried to emphasise the question of heredity and that the ancestor of the Habsburg type had probably suffered from some kind of respiratory trouble which had caused the peculiar flattening of the upper jaw; perhaps Jeanne la Folle, daughter of Ferdinand and Isabella of Spain, had inherited the small narrow maxilla from the long-headed race. Mrs. Lindsay did not wish to say that adenoids had anything to do with the condition, but when an observer saw an adenoidal countenance he concluded that respiratory trouble existed. The President had referred to a case—she thought in 1923—seen by a dentist[8] in Bristol, of two sisters with complete closure of the choanæ and extensive adenoids, whose jaws were nevertheless well developed; adenoids therefore had nothing to do with this condition. She had only shown that the Habsburgs had had respiratory trouble, and had probably thrown forward their lower jaw and altered their condyles and the angle at which the ascending ramus met the body of the jaw. Once that type had been fixed, it was handed down. This was the point at which heredity came in; heredity was not the cause, the cause had come in the ancestor.

She felt highly honoured that Mr. Charles should have attended the meeting and taken part in the discussion. She did not think that bending occurred.

Dr. Breitner had, she thought, shown that complete transformation and reconstruction of that part of the mandible took place, and that this stimulated growth in the length of the mandible. When pressure took place under the condyle a stimulation of growth occurred—if that was the growing part of the jaw, as Dr. Schmidhüber had seemed to prove in his experiments. The skull which she had exhibited showed the point which Mr. Cutler had made: the eminentia articularis had almost completely disappeared, and the man must have thrown his jaw forward constantly resulting in a reconstruction. The head of the condyle was very much absorbed and had definitely come forward.

On the effect of extraction, her experience showed that, if the lower jaw had been thrown forward, it was almost impossible in later life to keep the lower arch behind the upper. The lower jaw seemed to continue to grow forward even in old age.

In reply to Mr. Bull, she did not think that the court painter would have painted these features unless they had been there. He would not have made, as Mr. Bull had said, such ugly pictures, but would have tried to make them handsome. Moreover, they were so numerous. She invited any of the meeting who were ever in Florence to look at these rows of portraits, all very much alike; no observer could avoid remarking on the heavy open mouth and lower jaw with, here and there, a very marked Class II. She had been interested to see the adenoidal child Charles II develop into the man with inferior protrusion.

She showed the book which Dr. Robin had published entitled "Glossoptosis." This work illustrated adults, as well as children, with the monoblock. Robin contended that he could alter the glenoid cavity in them. The change involved not only the ligament but the whole bone of the joint.

On the question of endocrines, Professor Sir Arthur Keith had spoken of Darwin's theory of parthenogenesis as foreshdaowing the theory of endocrine influence, in that it was a streaming out from all the tissues and some kind of hidden stimulus passing on the acquired characteristic to the offspring.

She repeated her thanks to the meeting for their reception of the paper.

The PRESIDENT announced that it only remained for him to express on behalf of the meeting their very hearty thanks to Mr. Bull for his short communication and to Mrs. Lindsay for her paper. The next meeting would, he said, be a demonstration meeting, and would be held on May 4th at the Institute of Hygiene, 28, Portland Place, which was quite close to the Queen's Hall. He reminded the meeting that this was the last occasion since its formation that the British Society for the Study of Orthodontics would meet in the present premises. It must be with some reluctance, he said, that they took their departure from what had been their home for so long, but he trusted that the Society would attend in large numbers and ensure a good house-warming in their new quarters.

Mrs. LINDSAY stated that Mr. Macdonald Watson had offered the models and photographs which she had shown as a gift to the museum.

The PRESIDENT thanked Mrs. Lindsay, and assured her that the Society would accept the gift with very great pleasure. He asked her to express their very grateful thanks to Mr. Macdonald Watson.

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Mr. F. Bocquet Bull read the following communication :—

A CASE OF IMMEDIATE TORSION INVOLVING SECONDARY TREATMENT.

By F. Bocquet Bull, M.R.C.S., L.R.C.P., L.D.S.

In 1921 I read a paper before this society on " The Immediate Torsion of Incisor Teeth," in which I described the method for rotation of incisor teeth by means of forceps under an anæsthetic, and showed that to be successful it was necessary for the tooth to have an apical foramen which was still open. I further showed by means of films that in those cases where the foramen was an open one the tooth went on developing after rotation.

Now, it is obvious that in the cases which lend themselves to this method, apart from the position of rotation, the tooth may be fully or only partially erupted. In the majority of cases the teeth are fully erupted, and therefore the only movement to be imparted is one of rotation. Very rarely the tooth is only partially erupted. Under these circumstances rotation can be employed, but with the probability that at a later stage it will be necessary to draw the tooth into position.

It is obviously impossible to draw the tooth down to its correct alignment when rotating, for the tooth would lose all connection with its socket, and this evening I should like to show you the case of a partially-erupted and rotated incisor to which immediate torsion was applied about four years ago. I regret that the original models have been mislaid, but the original film will show you the position of the tooth.

The tooth was rotated and splinted in the ordinary way and remained vital. (Fig. 1.)

At a later period the splint was removed and the patient was not heard of until July, 1929, about eighteen months ago, when she presented herself again. The tooth was still vital, and X-rays showed a normal root and apex.

The secondary treatment that the case involved I will now describe. A critical examination of the position of the teeth on the side of the maxilla in question showed the following points :—

(1) Lack of eruption of $\underline{1|}$

(2) Mesioversion of $\underline{2|}$

(3) Crowding of $\underline{4\ 3|}$ region. (Fig. 2.)

The treatment consisted of the extraction of the first premolar. The enamel of $\underline{1|}$ was exposed in the cervical region under a local anæsthetic, and a small pin-hook was inserted in a hole drilled in the labio-cervical region. A fixed arch was applied to retract the canine, to rotate and retract the lateral, and for retraction on the partially-erupted central. This apparatus was fixed in August, 1929. In October, 1929, the case note report states that the downward movement had been only slight, although the force was efficiently applied. It was not until a month later that gradual downward movement became really manifest. After that progress was uneventful until completion, and finally a retention plate was inserted. The cervical hook was retained in the form of a small step to prevent depression of the tooth by incisal force. (Figs. 3 and 4.)

The final X-rays show the apex normal in the new position. Vitality is fully maintained. (Figs. 5 and 6.)

Fig. 1.

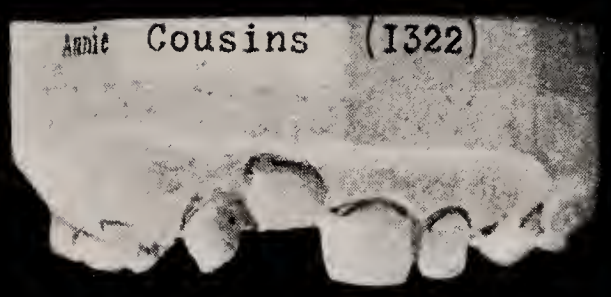

Fig. 2.

Fig. 3.

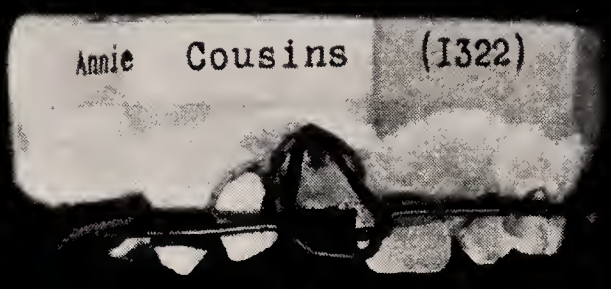

Fig. 4.

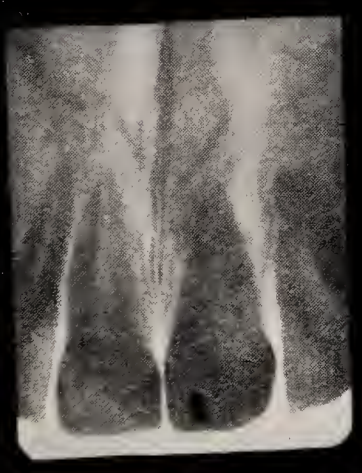

Fig. 5.

Fig. 6.

Illustrating Mr. F. Bocquet Bull's Communication.

This case is not without interest in showing :—

(1) The reluctance of the tooth to erupt at first under efficient treatment, which suggests that some fibrosis of the periodontal membrane had probably taken place.

(2) The development of the root after immediate torsion.

(3) The method used in drawing the tooth into normal position.

(4) The vitality of the pulp four years after the original operation.

Discussion.

Mr. H. G. Watkin asked why Mr. Bull had thought it necessary to drill the hole in the tooth and insert a pin ; he asked whether a band would not have been sufficient and have done less damage.

Mr. Bull replied that he always found that a pin was somewhat simpler in use and did not do much damage to the teeth ; it did not encumber the process of drawing the tooth down, as perhaps a band sometimes did. Moreover, it did not irritate adjacent teeth. The question was one of personal preference.

Mr. H. C. Visick asked whether Mr. Bull did not think that his last X-ray photograph showed that the pulp of the tooth that had been moved had undergone some change. The outline of the pulp chamber had seemed to him to be almost obliterated ; this was only what might have been expected. He said that he had often seen, in a tooth that had received a blow, the pulp chamber slowly ossify ; the tooth finally—perhaps many years afterwards—became discoloured. It did not become septic, but merely dried up, and the pulp chamber always closed.

Mr. Bull, in reply, regretted that he could not say anything about the discoloration of the tooth, because the series of pictures had been taken four years previously. In the only case he had seen since the end of the treatment, the tooth had appeared perfectly normal and the pulp was undoubtedly vital. There had certainly been some fibrotic change around the root itself which probably obscured a clear view of the pulp canal. If Mr. Visick would ask him that question in another ten years' time, he might be able to give a more definite answer.

Mr. A. E. Marsh inquired whether the tests made for the vitality of the pulp had shown any difference between this tooth and its neighbours.

Mr. Bull answered that he had not applied the test in this case, but had in all the others. He suggested that Mr. R. Cutler, who had himself performed the test, should answer the question.

Mr. Cutler said that he had tried cold and heat by ethyl chloride and hot gutta-percha ; the thermal changes had been precisely the same as in the adjoining teeth and of the same intensity. He referred to Mr. Watkin's point about the use of a band ; he had tried three times to put a band on this tooth, but each time it had come off.

The President remarked that this was a very good reason for putting in a stud. He hoped that Mr. Bull would be able to keep an eye on this case and take an X-ray film in two or three years' time. He himself had had a case somewhat similar to this. Several years ago he had reported to the society a case of a very severe degree of malocclusion in the incisor region caused by two supernumerary teeth ; he had rotated the left upper central incisor, which had been lying very obliquely and high up. He was unable to say whether the apical foramen had been open, though from the age of the child it was probably closed. The rotation had been done by immediate torsion quite successfully, and later on the tooth had been drawn down into position. He had seen the child at intervals for five or six years afterwards, and at the last examination an X-ray had shown that there had been a good deal of absorption of the root. Although the tooth had remained a good colour and perfectly firm and had reacted to thermal changes, yet the reaction had been perceptibly less than that of the other teeth. The subsequent history of Mr. Bull's case ought therefore to be interesting, and he hoped that Mr. Bull would be able to report it to the society during the next few years.

A DEMONSTRATION meeting was held on May 4th, 1931.

DEMONSTRATION MEETING.

TECHNIQUE OF CAST CAP MAKING FOR ANCHORAGE OF FIXED APPLIANCES.

Mr. BOCQUET BULL and Mr. R. E. RIX demonstrated the construction and application of anchor caps for use in orthodontics. These caps are used in place of the usual anchor band, and the advantages obtained are: (1) the soft tissues at the cervical margin of the tooth are untouched; (2) separation of the teeth is unnecessary; (3) perfect application can be obtained; and (4) with the exception of impression-taking and cementing the cap, all construction is performed without the presence of the patient.

The method of construction is as follows: an impression of the tooth or teeth to be capped is taken, and this is cast in either plaster or investing material. On the model thus obtained is moulded No. 7 gauge casting wax, which is pressed so well home on the crown by articulation with the opposing teeth that the cusps of the tooth are left uncovered. Care should be taken to leave it just free of the contact points of the teeth. The wax is trimmed to a distance of about 1 mm. from the gum margin. At this stage the attachment is waxed on in its required alignment and sprue wires attached. If the matrix is to be moulded on to plaster care should be taken to stearine the plaster model beforehand or to soak it in water, as this will facilitate the removal of the matrix for investment. If, on the other hand, the impression has been cast in investing material, there is obviously no necessity to remove it, as the matrix on the investing material can be sunk just as it is.

The usual casting procedure is then followed, using Ash's standard silver. At this stage it is advisable to strengthen the junction of the attachment to the cap by means of solder. The periphery of the cap is then taken to a knife edge and the piece of apparatus finally gilded and polished. The fixing of the cap to the tooth is best carried out with copper oxyphosphate cement.

STAINLESS STEEL SOLDERING.

Mr. BOCQUET BULL and Mr. R. E. RIX demonstrated the soldering of stainless steel in the use of orthodontic apparatus. The particular type of stainless steel used is known as "Staybrite," as this is uninfluenced by oral fluids and everyday foodstuff.

The solder used is silver solder, and the flux a mixture in equal parts of boracic acid and potassium fluoride.

Care should be taken that the heating should not be carried further than 1,000° C., otherwise oxidation will take place. Flux is attached to the parts to be united, solder flowed over one part, the two parts held together in the flame and the solder allowed to flow to the other.

As the steel becomes softened on soldering it is necessary to: (1) Reharden. This may be done by manipulation. (2) Use the joint purely as an anchorage, and make the spring work from a suitable fulcrum, such as a sleeve soldered to the bow away from the anchorage.

Tools, etc., I Use in Orthodontic Work.

Mr. G. F. Cale-Matthews: Most of the work is done directly to the mouth. Time is the main decider of this method. It is both quicker and more accurate to work directly to the mouth than to models in the majority of cases.

Procedure.—Sufficient spacing to allow the easy passage of anchor bands. All soldering done at the chair-side. Either band material, S.S.W. strip or Aderer's noxidium seamless bands, are used, and the band fitted and contoured. Usual time, fifteen to twenty minutes each. All attachments to bands are then made, vertical tubes and spurs for lingual arch attachment and horizontal tube for buccal arch. Gauge to take .038 wire. Lingual arch and buccal arch are both .038 gauge. All springs are of ·022 or ·020 gauge. Band metals: molars, .006; incisors, .003. Canines and premolars may be .004. These materials fulfil all general requirements.

Tools.—Blowpipe Melotte with compressed air. Bunsen burner (fine). Wire solder, 14, 16 and 18 ct. Tweezers: angled; Aderer's (tantalum points). Pliers: How's, Nos. 110 and 111; Mershon's contouring; Fisher's, plain and serrated; cutting, S.S.W.; cutting, ordinary; Jackson's (wire-stretching); half-round; and round. Flux: Ranson Randolph soldering powder; bowl of cold water for plunging. Use stones instead of files. It is important to limit the amount of equipment. Very few tools are absolutely necessary. The training of one's fingers is essential.

Working to Models.—Anchor bands are fitted, an impression is taken, bands are removed and transferred to the impression, which is poured in stone, if time permits, otherwise in plaster and pumice mixture. This necessitates care as it may be friable under heat. The procedure is then the same as worked at the chair-side.

Dr. B. Gottlieb's Work on Traumatic Occlusion.

Dr. E. W. Fish: In this series of experiments Dr. Gottlieb produced tooth movement in dogs by means of cementing metal caps to certain teeth and examined the teeth and jaws microscopically after the caps had been left on the teeth for varying periods of time.

The result of cementing a cap to one tooth is of course that it comes into occlusion with its antagonist before the other teeth meet and so takes the greater part of the strain of mastication. A simpler method of producing unnatural stresses on a tooth which was used when the effects of shorter periods of pressure duration were being investigated was to ligate the tooth, renewing the ligature at twelve-hour intervals.

It is only possible to summarise briefly the observations made by Dr. Gottlieb upon these animals.

After twenty-four hours' ligation of a tooth, resorption of the bone by giant cells could be observed; on the side of the tooth where the tissues were under tension, the fibres of the periodontal membrane are stretched, and after forty-eight hours new bone is being laid down along the lines of these (Sharpey's) fibres.

If the pressure produced by the traumatic occlusion is severe enough to bring the root of the tooth in actual contact with the bone, the periodontal tissues between the tooth and bone at the point of contact are of course destroyed, but the bone which is in actual contact with the cementum of the tooth does not resorb,

presumably because it is necessary to have connective tissue in contact with it to produce resorption. On the other hand, what Gottlieb calls "*back resorption*" is observed. The piece of bone in contact with the tooth is undermined and isolated by resorption occurring all round it except at the point of contact.

If the apex of a growing tooth which is not yet completely formed comes in contact with the bone, it will be bent by the pressure against the bone on that side, and by the tension of the periodontal fibres on the other, to produce a definite distortion of the remainder of the root as it subsequently calcifies.

When the alveolar process is in danger of being destroyed altogether by the movement of a tooth, bone is laid down on the external submucous surface of the alveolus to compensate for the absorption which takes place in the periodontal surface.

In an experiment where all the teeth on one side were capped for eleven months, it was found after nine months that the opposite side had come into occlusion. At the end of the experiment the jaw on the pressure side had become much shorter and wider in section and the cancellous tissue was more dense. Finally, it was noted that in no case was there any resorption of the cementum. An exception to this rule only occurred in cases where the cap came off accidentally, and in these cases there was found, three months after the cap came off, actual bony ankylosis between bone and cementum in places, and between bone and dentine in other spots where the cementum had been absorbed. One case is shown where resorption of cementum, dentine and even enamel had occurred following the loss of a cap and the bony repair of the resulting cavity had interfered with the down growth of the epithelium and produced an epithelial pearl.

Bands.

Mr. Norman Gray: I have been asked for the sake of some of the newer members of the Society to demonstrate the technique for making precious metal bands. These are made of S.S.W. band material, formula B. Gauge for molars, .18 × .006; gauge for incisors, .18 × .003.

By means of Hollingsworth's small copper strips (used for measuring roots for crowns), the circumference of the crown at the cervical margin is measured exactly, and the strip of band material cut off one millimetre longer than the copper wire strip. A slight bevel is put on one edge, and the band bent round into the form of a ring with the overlapped edges in contact. If there is any difficulty in doing this, the edges can be held in position with soldering pliers, the band heated and then chilled in cold water. This anneals the band, and it will be found that the edges remain in contact.

The band is now heated and a spot of flux paste melted along the edges. The edges are then heated to redness with the blowpipe and a spot of 18 ct. wire solder applied. This will immediately flow along the cut edges of the band. The band is again annealed by heating to redness and quenching in water. With the join on the lingual side of the tooth, the band is placed over the molar and pressed on to the crown.

Once the band begins to grip the crown firmly, the child may be asked to bite the band home, and this can be greatly facilitated by placing a wooden tongue depressor on the biting surface of the band.

The child invariably prefers to bite the band home itself, rather than to have pressure applied in the mouth.

As the band begins to conform to the shape of the tooth, it is removed with Dr. Case's band-removing pliers and again annealed.

The next step is swelling out the contour of the band by means of S.S.W. contouring pliers No. 145. This allows a space for the cement and enables the band to be more readily adapted to the contours of the crown.

The band is again annealed and again bitten into place.

The final stage is to burnish the occlusal surface of the band to the tooth, and this can be done most readily on the tooth with an S.S.W. band-pusher, an instrument which is invaluable.

The attachments for the appliance are soldered to the band, scratch-marks having been put on the bands when on the teeth to show the correct position.

After the attachments have been soldered and the bands re-inserted on the teeth, a compound impression is taken. When this is removed, chill and very carefully insert the bands into the compound. The impression is now ready to be poured, and the final model will show the banded teeth as in the mouth, ready for the appliance to be made.

Retaining Removable Appliances.

Mr. Visick was unable to show more than two methods.

The first well-known method consists of a gold wire attached to the plate and passing over the occlusal plane between two temporary molars or premolars, then being turned up towards the gum and ending in a small knob which is bent into the interdental space. This can be adjusted so that the plate goes in with a snap, the little knob lodging in the triangular space between the teeth.

The other demonstration was Mr. Visick's own addition to the Jackson crib, and consists of a flattened spur of 16 ct. gold placed on the lingual side of the tooth to be cribbed.

A small slot is scraped in the model, and in this the spur is placed so that in the finished plate the gold slips up between the tooth and the gum sufficiently far to get a grip of the tooth, but not far enough to touch the periodontal membrane. This lingual spur opposes the pressure from the ordinary Jackson crib on the outside of the tooth. The principle to be aimed at is the gripping of the tooth at the neck where it is of a smaller diameter than the crown. The Jackson crib obtains its best grip at the mesial and distal angles of the buccal side. The lingual spur passes over the bulge of the tooth, and gets on to the narrower part of the neck of the tooth. These three points, when at rest, form a smaller triangle than the part of the tooth which they pass over on their way into position, with the result that the plate goes into place with a snap and is held perfectly rigid.

In the case of temporary molars where the buccal cingulum is more developed, the best grip is often obtained by the use of a three-quarter crib, that is a wire across the occlusal plane between the two molars, and the free end finishing along the buccal side in a flattened blade, which can be easily adjusted in the mouth to take the greatest advantage of any projecting cingulum.

Points in Dentocoll Technique for Orthodontic Work.

Mr. H. G. Watkin gave a demonstration on the technique of Dentocoll impressions. He laid stress on the importance of cooling

the syringe with lukewarm water as cold water was liable to overchill the outer layers and make it necessary to reboil to obtain the correct result. When taking an impression of a plaster model the latter should be soaked in lukewarm water. The moisture prevented sticking and the warmth allowed time for the material to flow without being chilled and produced a better result than if the model was cold. He advocated the use of polished unperforated trays in preference to the special ones supplied by the manufacturers. The handle should not be used in removing the tray. If the tray came away at all the cooled Dentocoll would easily slip back into its correct place on a smooth tray, but it was almost impossible to replace a displaced impression into a perforated tray. In taking an impression from a model there was far less danger of damage to the model if the tray was removed first. The material could then be easily sprung from the model and carefully replaced in the tray before casting. He always used Dentocoll when a plate was to be made as he considered the results quite equal to those obtained with plaster and with far less trouble and less unpleasantness to the patient.

The Northcroft Plaster Plane.

Mr. G. Northcroft demonstrated his plaster plane. A description will be found in the *Transactions* B.S.S.O., 1930.

A meeting of the Society was held at the Institute of Hygiene, Portland Place, on Monday, October 5th, 1931. Mr. A. T. Pitts, D.S.O., President, was in the chair.

After the minutes had been signed, the President, the members standing spoke as follows :

" Since our last meeting a member of the Society has passed away in the person of Sir Harry Baldwin. In 1912 he was the President of the Society. He was for a great many years a highly distinguished and much loved member of the dental profession. He had a career of exceptional brilliancy, and, as we all know, he was dental surgeon to H.M. the King. He was a man of the most exceptional charm; everybody who knew him liked him very much indeed. His interest in all dental matters was very great, and even after his retirement he took the keenest possible interest in matters affecting the profession. I am sure it would be your wish that a letter of condolence should be sent to his widow.

" This, I think, is also the occasion on which one should allude to the tragic death of one who, though not a member of this Society, was yet a prominent figure in the world of orthodontics, namely, the late Mr. Victor Smith. He was a member of the Executive of the Second International Orthodontic Congress. His work in that connection is known to all those who took any official part in the Congress. I can speak from personal experience in saying that he rendered most valuable services to that Congress, and I am sure that it would be the wish of all present that a letter of condolence should be sent to his relatives."

The candidates approved by the Council, whose names were set out on the agenda, were elected, on a show of hands, members of the Society. Miss Clinch, a newly elected member, was welcomed by the President, and signed the Obligation Book.

Mr. Berrtam Samuel read a paper, Some Observations on Orthodontic Diagnosis.

Mr. Hayton Williams read a Casual Communication entitled Two Cases Treated with the Ribbon Arch, illustrated by the epidiascope.

SOME OBSERVATIONS ON ORTHODONTIC DIAGNOSIS.

By Bertram Samuel, L.D.S.Eng.

The title I have taken for this paper might at first view suggest that I had some theories of my own to bring forward ; this is not so. I merely propose giving you some particular points that have impressed themselves upon me during the last ten or twelve years, and "Orthodontic Observations" would perhaps be a better heading.

At the outset I should like to offer my thanks to Professor J. C. Brash, of Edinburgh University, for his masterly analysis of all work recorded on the subject of the Etiology of Irregularity and Malocclusion of the Teeth, and for his summing up of the present position, given to us this year as a publication of the Dental Board of the United Kingdom.[1] The student is spared now the necessity of reading hundreds of articles on this subject, all the matter required being to hand in Dr. Brash's very interesting and readable volume.

At the present stage I think we have to assume that the etiology of orthodontic defects, other than those of local and obvious origin (such as the provision of too few or too many teeth), is still an uncertainty. There are many theories, but the door is not yet widely open to us. Indeed I incline to the view that a good many, even of those that have been assigned to local causes, should be taken as unproven.

Like most others in this hall, my orthodontic education and practice began with the Classification formulated by Edward Angle.[2] I think we are all agreed that this arrangement has been a very useful stepping stone for us ; for one thing it definitely draws attention to "arch relationship," an important matter that was apt to be passed over before this, and, with its great simplicity, gave us a common language at a time when some code was badly needed. It might now be discarded in the light of our present knowledge, one reason being that it exceeds its duty in suggesting by implication certain lines of treatment. Incidentally (though this is a minor point), I have myself never been able to see the justification, or the necessity, for the sub-divisions of Class II and Class III. In my own observation I have found that where the teeth of one side of the arch are in correct relationship, the other being abnormal, this has usually been brought about by a "cross over bite" in order to obtain functional occlusion. This state has of

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[1] The Ætiology of Irregularity and Malocclusion of the Teeth. J. C. Brash, Dental Board of the U.K., 1931. 5*s*. net

[2] Classification of E. H. Angle, 1899, based on Relation of First Permanent Molars.

Class I.—Normal Mesio-distal Malocclusion of Anterior Teeth only.

Class II.—Lower Distal. Retrusion.

Division 1. Protruding Incisors. Mouth Breathers.
(*a*) Bilateral.
(*b*) Unilateral.

Division 2. Retruding Incisors. Normal Breathers.
(*a*) Bilateral.
(*b*) Unilateral.

Class III.—Lower Mesial. Protrusion.
(*a*) Bilateral.
(*b*) Unilateral.

course to be differentiated from those frequent cases where the posterior teeth of one side have travelled forward, following on loss of the deciduous molars or canines. One is able to confirm that the mandible has swung over by noting that the maxillary and mandibular centres do not correspond.

For some years now it has been my habit when examining an orthodontic case to remind myself that there are three conditions that we are called upon to treat, either separately or in combination, viz.: (1) Tooth position, (2) Arch form, (3) Arch relationship, and carefully to analyse the case on this basis. This is, of course, reminiscent of the classification formulated by Sir Norman Bennett, or, rather, to the anatomical basis of that classification.[3] It will be noted that whereas Angle's Classification only takes account of arch-relationship in an antero-posterior direction, Bennett's is more complete, as it emphasises this relationship in the lateral and vertical directions as well.

A short time ago our President (Mr. A. T. Pitts) in an interesting paper suggested that certain modifications be introduced into Angle's Classification. I am hoping that he will modify his views and recommend for general acceptance of the working dentist this very excellent *aide-memoire* of Bennett's.

The next step is an attempt to discover the origin of the disability in the particular case under examination. The surgical and common sense method then is to treat or remove the cause, but when we cannot be agreed as to what the cause is, it is reasonable to treat the symptom, or condition, as we see it, for as Mr. Harold Chapman reminds us, there are many cases of malocclusion which we are able to treat successfully without knowing their causation. But this remark of mine needs qualifying ; the symptom that needs treating is not necessarily the one that the " man in the street " notes, although this is not infrequently done.

Now I believe that what might be termed the " mechanical factor " in causation has, in the past, been over-emphasised. By this I mean that the various attractive theories, such as adenoid over-growth and enlarged tonsils, by bringing on mouth breathing, once placed high on the causation list, should occupy a much humbler position ; the same applies to various sucking habits. By this I do not mean that the " mechanical factors " do not play their part, for from our knowledge on how tooth movement can be brought about by the continuous pressure of light appliances, it is obvious that thumb or finger, applied over a long period to the teeth will bring about some movement. I do consider, however, that in the past we have unduly stressed the " mechanical factor." If, by sturdy cross-examination of the parent or the patient, we were able to wring the admission that a comforter had been used, or the thumb had been sucked, we sank back com-

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[3] The Anatomical Basis of Sir Norman Bennett's Classification.

I.—Abnormal Position of one or more Teeth.

II.—Abnormal Formation of a Part or the Whole of either Arch.

III.—Abnormal Relationship between the Upper and Lower Arches.

1. Vertical. (*a*) Open bite. (*b*) Close bite.
2. Antero-posterior. Pre-normal or post-normal (with reference to relation of Lower to Upper Arch.).
3. Lateral. Labial or Lingual Occlusion.

placently, sure in the belief that we had probed to the very root of the matter! Of recent years, having had the opportunity of seeing a great number of children and infants, it has been brought home to me that many of these typical "mechanical factor" cases themselves denied such an origin, and when the parent assures me that these factors do not exist I am constrained to believe her. I mention this because it is not the general attitude—I note a writer in a recent issue of the *Int. Journal of Orthodontia*, discussing cases having correct antero-posterior relation of the arches with protruding maxillary incisors says :—

"The patients or parents may insist that they do not breathe through their mouths, but if they were not mouth-breathers with abnormal muscular action, this type of malocclusion would not exist."

In considering cases involving abnormal arch-relationship in the antero-posterior direction, my own views appear to have changed in recent years ; nowadays I look upon post-normal occlusion as being pre-natal in origin, though in some cases the hereditary make-up has included a narrow pre-maxillary region whereby the mandible is prevented, by the position of the maxillary canines, from coming forward. Likewise I consider cases of pre-normal occlusion to be pre-natal in origin, but these cases are aggravated very frequently by the patient thrusting forward the mandible in order to obtain a functional occlusion.

My own observations do not support the hypothesis that these pre-normal cases are caused by the thrusting forward of the mandible in order to gain relief from enlarged tonsils.

In examining numbers of mixed dentures one notes how frequently there has been little or no change in size between the dental arches of the two-year-old child with its complete deciduous dentition and the child at approximately seven years of age when the much larger permanent teeth are in process of replacing them.

One should remember that the size of the dental arches serves as an index of the amount of bone growth of the jaws and is dependent on that growth. Once the opposite view was held, that the presence of teeth stimulated bone growth.

It seems that the periods of bone growth vary very much in intensity and time of occurrence in different individuals. Whatever its cause, this variability, I believe, to be one of the most frequent conditions in the early history of many of our orthodontic cases. The condition of irregular growth in the 2 to 7 age period gives us, in my observation, when combined with abnormal antero-posterior arch-relationship, some of our most involved cases.

It is observed in examining older children that with the eruption of the permanent teeth the earlier orthodontic history becomes obscured. We have long realised that similar orthodontic conditions may have different origins, but, I believe, the reverse also holds—that the earlier history of many very dissimilar cases is the same. Taking for example a denture where the permanent incisors are due to erupt, assuming that these cannot come into alignment between the deciduous canines owing to insufficient bone growth—then I believe that the position these incisors eventually come to take in the dental arch is just fortuitous.

In summing up the results of my observations in a few words I would say that abnormal arch-relationship in the antero-posterior direction is pre-natal in origin influenced by heredity, and, as Sir Arthur Keith tells us, possibly part of an evolutionary tendency in regard to the ever increasing condition of post-normal arch-relationship. Professor Brash reminds us that etiology and causation though usually employed by us as synonyms are not the same thing, and I would say that the causation of most of our cases—excluding antero-posterior arch-relationship—is variability or irregularity in bone growth. The various causes of this irregular bone growth I can only conjecture and guess at—I do not know, though I am inclined to rate the hereditary factor fairly high.

Some years ago I read a modest paper to a group of dentists entitled, "Simplified Orthodontics." I propose ending these notes with the peroration of that paper as it may serve to lend some practical application to my remarks—I then said :—

"I am convinced that the future lies in concentration more on the diagnosis and etiology of orthodontic defects than on the ability of pretty pieces of mechanism to move teeth.

I have formulated certain rules for myself, and, elementary as they are, I hope that you will not think it impertinent my mentioning them to a gathering such as this :—

(1) Never express an opinion on a case without examining carefully both the patient and the dental casts—these two are complementary one to the other—one notes the facial lines in the patient and one sees better the occlusal relation of the teeth and dental arches in well-made plaster casts.

(2) In undertaking treatment of a case always keep for reference the plaster casts of the original condition.

(3) Appreciate that most cases fall under two headings :—

(a) When the condition is brought about by early loss of the deciduous teeth and consequent "drifting" in position of the permanent.

(b) When the disability is a symptom of defective bone growth (and one could add also a combination of these two).

(4) Do not too readily ascribe the majority of cases to habits.

(5) Remember that we are called upon to correct three conditions, either separately or in combination :—

(a) Tooth position.

(b) Arch-form (or shape).

(c) Arch-relationship.

(6) In using removable appliances remember that it is very seldom necessary to "cap" or "gag" the bite—vulcanite plates made to cover the teeth are clumsy and dirty, and by upsetting the occlusion of the back teeth may do positive harm. When told that it is necessary to "prop the bite" in order to move a tooth over the bite, remember that during the greater part of the twenty-four hours the teeth are not in occlusion.

(7) What ever type of appliance is used—whether fixed or removable—let it be simple. That is to say, do not attempt to do too much

with any one appliance. The efficiency of any apparatus depends on its anchorage, and when stresses are applied in varying directions this anchorage becomes unstable.

(8) Remember that we are dealing with a growing child and endeavour to look ahead and visualise what the orthodontic future will be. Certain types of cases do improve without treatment ; indeed, a cynical confrere of mine once said that our most successful cases are probably those which Nature would have corrected without our aid."

Discussion.

Mr. Harold Chapman said that Mr. Samuel had brought forward a number of interesting points. He had questioned the value of dividing Classes II and III in Angle's classification into unilateral and bilateral. He had rather gathered that Mr. Samuel seemed to think that these were not two different entities. For his own part he had never been able to arrive at any conclusion on the subject, but he did not think he could quite agree with the view Mr. Samuel had taken. It did not seem to him that, generally speaking, it was a matter of the mandible swinging over, though he thought that happened in a few exceptional cases. The lower arch was prevented from moving forward in some way ; it seemed that in some cases the unilateral condition was associated with excessive overbite and this might be a causal factor. Nevertheless, he was compelled to admit that it was a matter on which he felt diffident about offering an opinion. Of course, if the etiology of the condition could be arrived at, it would prove very helpful in treatment. He wished to thank Mr. Samuel for so exhaustively covering the ground of etiology and diagnosis.

Miss Smythe said that with regard to the sub-divisions of so-called Class II cases, it had been her experience with such cases that a great number of them did not either fall into the fully recognised sub-division I or sub-division II at all. There was neither protrusion nor retrusion of the incisors. These cases should have a class of their own, in her opinion.

Mr. Harold Chapman said that Miss Smythe's remark had reminded him of another point on which he might say a word. His own feeling was that in Division 1 of Class II the upper central incisors were practically always in their correct position ; it was very rare that those teeth were too far forward. He had pushed them back at times, and on nearly every occasion on which he had done so he had had to let them come forward again. Now he made sure that they were not too far forward before he began. He would rather like to lay down that in Clause 2, Division 1 cases, the upper incisors were not too far forward, but were correctly placed. At any rate, he judged the cases in which they were too far forward did not represent more than 10 per cent.

Mr. A. L. Packham asked whether Mr. Chapman was referring to the apices of the teeth or their cutting edges.

Mr. Chapman, in reply, said that he would hedge on that question, and say he referred to the centre of the crowns. He believed the case which Mr. Packham had in mind was one in which the crown was certainly inclined forward or in proclination.

The President said that the subject of diagnosis was obviously one of very great importance. Mr. Samuel rather suggested that Angle's classification was obsolete, but here the speaker was not sure that he could agree with him, because it seemed to him that nearly 80 per cent. of all the cases referred for treatment were irregularities in the antero-posterior relationship, which was covered by Angle's classification, and that only a minority of cases were really abnormalities in the vertical or in the transverse plane. Therefore it seemed to him that Angle's classification still had a very useful place as being a convenient sort of way of describing these forms of arch-relationship. Mr. Samuel had appealed to him to withdraw a somewhat hazardous contribution which he, the President, had made to this subject. His contribution was to suggest the transference of the Class II, Division 2 case to Class I, and to speak of it as Class I, Division 3, because it had seemed to him that there one had a primary defect in the maxilla which called for treatment, and that the posterior relationship of the lower teeth was secondary to the maxillary retrusion. That, however, was a minor matter. The ideal classification would be one that not only

took into account the arch relationships, but also the etiology. Unfortunately very little was known about the etiology. The net result of Professor Brash's investigations was that their cherished beliefs were thrown overboard, and they were left like a ship without a rudder. He gathered from what Mr. Chapman had written in the second edition of Bennett's book, that he was in the same position, of being almost a complete agnostic so far as etiology was concerned. Therefore one had to depend on the arch-relationship. The case was rather like that of a physician, who could diagnose only dullness in the chest without being able to say whether it was due to pleural effusion, tubercular infection, or malignant growth. A good deal of prognosis was often empirical, and likely to be overset because a certain abnormal arch relationship might possibly have several causes. It had always seemed to him that while in a good many cases the diagnosis was fairly simple, although the treatment might not be simple at all, and the prognosis very difficult, there were some cases in which it was difficult even to make a diagnosis. The vast majority of practitioners in this country were not orthodontists, but general practitioners, and perhaps one was not being unkind in saying that their knowledge of orthodontics was not very profound, and depended a good deal on what they had picked up in hospital. He had found that the greatest pitfall of all in diagnosis appeared to be in those cases of post-normal occlusion, particularly in connection with the so-called Angle's Class II, Division 2. He had seen a great many such cases which were treated straight away by the extraction of the upper premolar and retrusion of the upper incisors in order to get them into line, thus making the maxillary retrusion, which was the primary defect, still more accentuated. When one had sometimes suggested that in these cases the right way to correct the condition was to advance the upper incisors, one had been met with a blank look of amazement at such a strange kind of treatment. Nevertheless, if such a condition were taken as essentially a retrusion of the jaws, the difficulty of diagnosis disappeared. This, he was convinced, was a real pitfall in orthodontic diagnosis. Mr. Chapman had made the startling statement that in Class II, Division 1 cases, there was no actual maxillary protrusion—it was only relative to the post-normal relationship of the lower teeth. The speaker could at least agree with him in this respect, that if the mandible were advanced to its correct position, and the lower incisors corrected, then the apparent maxillary protrusion did, to a large extent, disappear. But he thought there still remained an actual residual superior protrusion in a larger number of cases than the 10 per cent. to which Mr. Chapman had referred. But his statement had the merit of drawing attention to the fact that in Class II, Division 1 cases, it was necessary to treat the posterior relationship of the lower teeth first and then correct any maxillary protrusion that existed. In conclusion, he expressed his thanks to Mr. Samuel, with whom he had worked on these subjects for a great many years. He had provided a very useful paper.

Discussion.

Mr. Bertram Samuel, in reply, said that for his own part he would like to see Angle's classification given up altogether; he thought it misled the student very much. For example, Class 2 Division 1, suggested that the causation was associated with mouth-breathing and adenoids, and as to that they were not in agreement. He was of opinion that the anatomical basis of Bennett's classification was preferable. With regard to the little side-issue as to the unilateral and bilateral sub-division, he thought that most people were developed symmetrically. It was very rare to get one side of the jaw growing much longer than the other. He had seen a number of very small children where obviously there had been a swing over, and when those cases were seen six years later the origin was absolutely disguised, so that a student, seeing that case for the first time and acquainted with Angle's classification, would set it down as a case of Class 2 Division 1 Subdivision. The idea such a student obtained would be an incorrect one, namely that one side of the face had developed correctly and the other had not. He thought that cases of asymmetrical growth were very rare indeed.

Mr. Pitts had spoken of the difficulty of treatment, particularly of the post-normal occlusion cases with retruded upper incisors. They were indeed difficult, and some people had not made up their minds whether it was the right thing to make a space by extraction and bring together the teeth in the pre-maxillary part or to move forward the central incisors and then treat the postnormal arch, relationship.

CASES IN PRACTICE.

By D. S. Hayton-Williams, L.D.S.

I have chosen for casual communication this evening two cases treated with the ribbon arch. The use or mere mention of the ribbon arch, I know, is sufficient cause for my excommunication in the eyes of some members, in itself. But I am anticipating. Let me describe—

Case No. 1.

She is aged 12½. Is a small physically under-developed child—the remainder of the family are well built and normal with very sound, regular teeth. Her general condition has been somewhat of a problem to more than one child specialist. However, her main handicap is her mother, who insists in her hearing, that the child is nervous and always will be.

(a) *Models dated* 30/7/30. Note crowded mouth, rotated incisors. The child brings her lower jaw forward to find a bite of convenience. $\overline{6}|$ is missing having been extracted prior to my supervision. Numbers of temporary teeth roots present.

Treatment.

Radiographs for presence and position of premolars and upper left lateral. I then extracted the roots and also the four temporary canines with the idea of temporarily relieving the crowding and with the intention of extracting a permanent tooth or teeth at a later date.

Anchor bands were cemented to the 6's and ribbon arch applied with lock pins to brackets on pinch bands on the permanent upper incisors. This was on for six months, the arch being re-bent when necessary, and corrected the rotation of the incisors without any forward movement of the teeth. They were slightly separated however and were approximated with a simple nut and bolt appliance. A bite plate was also inserted at the latter stage on which the lower incisors impinged to open the bite.

(b) *Models dated* 29/7/31. Nearly exactly a year since I first saw the child. These models indicate very much what the state of the teeth is to-day. The patient is now wearing pinch bands soldered together on the upper incisors for retention and a bite plate with wires to guide $\underline{4}|$ to position and prevent $|\underline{4}$ from moving anteriorly.

These are some of the difficulties and points of interest I found with the case.

1. The absence of $\overline{6}|$ and instability of $\overline{TM2}|$ prevented me from correcting the rotation of the lower incisors. They have been corrected, however, to some extent naturally, and by the child applying digital torsion to them.

2. The false appearance, originally, of a Class III case owing to the awkward position of the upper and lower incisors.

3. The unusual order of eruption of the teeth. In the upper the $|\underline{2}$ had not erupted, while $\underline{5}|\underline{5}$ had erupted prior to $\underline{4}|\underline{4}$.

In the lower, $\overline{2}|$ had not erupted, while $\overline{4}|$ had, and $|\overline{4}$ had not.

It is now a case of hanging fire till more teeth erupt. Her doctor has prescribed cod liver oil as he thinks this may accelerate eruption of the teeth.

I have not yet definitely decided whether some extraction of permanent teeth may not be necessary eventually, as I have to bear in mind the small and frail physical build of the child and the last thing I wish her to have is a mouth giving the impression of an arcade of teeth.

Case No. 2.

She is aged 11 years and 7 months, is of normal size and suffering no known ailment of any description. The family, generally, have very large teeth.

(a) *Models dated* 24/3/30, show the condition of the mouth when I first saw the child. I X-rayed for premolars and found all present. There is nothing peculiar about the radiographs, so I am not showing them.

I decided to extract both upper and lower temporary canines (preparatory to extraction of permanent teeth later on) and wait a few months to see if any natural alignment of the incisors would occur. About four months later there was some very slight alteration for the good.

I decided to expand the upper with a plate and also to extract $\frac{4}{4}$ as I felt expansion alone would not make sufficient room. In addition a ribbon arch was applied to 2 1 | 1 2 with anchor bands on TM2's. The ribbon arch was sliding freely in the tubes, but I could see that while the rotation of the incisors was being corrected there was a very distinct and steady forward movement of them. I could think of nothing however to check this and despite careful rebending of the arch it continued.

Having corrected the rotation, I now retracted the upper incisors, keeping the pinch bands on the centrals with wire projections to the laterals to prevent a reversion to the rotated state. After expanding and retracting simultaneously for three months, I removed the pinch bands and had everything all but in position when sad to relate the patient became very slack in wearing her plate. She had not worn it for a week and naturally it was useless. A new one was made, a few days elapsing. By this time the incisors had started to revert, but I attempted to correct this by "kinking" the arch and allowing it to bear on the projecting angles of the teeth.

I was still further handicapped by an outbreak of mumps at her home, precluding visits to me. About a month ago also there was an outbreak of measles at home—a further hindrance. I don't suppose I am alone in finding these interruptions occurring at the most inopportune moment.

Regarding the outstanding lower 6's I did not use any appliance, but stoned the cusps to prevent any exaggerated interlock and felt they might find their position with the expanded upper 6's. $\frac{6|}{6|}$ have done so, but $\lceil\overline{6}$ is still buccal to $|\overline{6}$. I will not correct this in view of the uncertainty of co-operation from the patient and her mother. I may mention the child's father died about nine or twelve months ago, and I do not suppose the mother has the time she used to have to superintend the patient.

The latest models are the next dated—29/9/31.

The upper arch is considerably broader than the original and the rotation of the incisors has been practically corrected. When canines and second premolars are erupted there will be no intervals between the upper teeth.

The lower incisors, it will be noted, have become aligned without any appliance. I am going to extract the lower 4's soon and this with retention of the upper will complete treatment, since, as I have explained, I am not assured of co-operation from patient and mother, particularly so since the mother is quite content with the present state of things.

The point on which I would very much welcome enlightenment from those present, is whether upper incisors do not always come forward even with reciprocal force if a number of teeth have to be rotated, since, assuming the ribbon arch to be running freely in the buccal tubes there is a greater tendency for the incisors to move labially than palatally, particularly in a case such as this where the upper fronts had all to be rotated in the same direction, i.e. clockwise.

Discussion.

Mr. R. E. Rix remarked that the inclination of the upper incisors which had worried Mr. Hayton-Williams could be explained, he thought, fairly easily. In forcing those incisors into alignment, since their mesial distal line was at the greatest, they must perforce move laterally, unless some means were taken to move the laterals distally at the same time. He thought that in treatment, room should first of all be found for the alignment of the incisors before such alignment was proceeded with. It was desirable not to lead them into alignment before having made room for them.

Mr. Robert Cutler said that it was with considerable interest that the society had listened to the communication, because Mr. Hayton-Williams belonged to that ever-increasing section of junior members whom they all desired to encourage to take part in the proceedings. Mr. Williams had had the courage not only to embark upon a distinctly difficult method of treatment in his private practice, but to talk to his colleagues about some of the difficulties he had experienced. It was to be hoped that during the coming session many members would be anxious to bring forward communications of this nature for discussion. In such discussion only good would accrue to them all. The younger members in discussion discovered some of the pitfalls which must inevitably lie in their path in the future, while the older members were able to see new approaches to difficulties which they themselves had successfully surmounted in the past. The first case with which Mr. Williams had dealt was one in which he had conducted some orthodontic treatment of the upper jaw by means of a ribbon arch and had then put in an anterior biting plate to alleviate the close bite. He had stated that he had some difficulty in securing alignment of the lower incisors, seeing that the six-year-old molar was lost and the second temporary molar on that side was loose. The speaker would suggest that in a case like that it might have been advisable to have made the biting plane in the form of a very sharp incline in the upper, so that if the plate was worn at mealtimes the irregular margins of the lower incisor teeth would impinge upon it and the teeth would become automatically aligned. He showed in this connection a standard chart as used in Guy's Dental School. Such a procedure would accomplish the two results of alleviating the overbite and bringing about the alignment of the lower incisors without the need of any subsidiary appliance. In the second case Mr. Williams had described how he brought about alignment of the anterior teeth after he had conducted expansion, and he then stressed the tendency to relapse which occurred when the apparatus was inadvertently left out for some little while. That was particularly true in those cases where one endeavoured to get a straightening of the travel without expanding the arch at the same time. Where rotated incisors were present in an arch which was crowded, if one could expand that arch and at the same time bring about

straightening of the incisors during the time that expansion was going on, provided, of course, that the expansion had been consonant with the normal growth processes, then the plate could be abandoned at any time, and no relapse would occur. On the other hand, he might take a case where most of the temporary molars were lost, so that expansion by a plate was impossible; in such a case the tendency to relapse would be evident. Here the speaker showed another chart illustrating the crowded arch with rotated incisors, where, by means of the wearing of the upper Badcock expansion alignment appliance, as expansion proceeded, one got a spontaneous and complete alignment of the anterior teeth. Provided the expansion had been carried out at the correct moment, one could take out the plate and no relapse ever occur. That, of course, was conditional upon the expansion being carried out in the proper manner. If one was not able to expand under the physiological correct conditions, the tendency to relapse was perfectly appalling. He thought that Mr. Williams was to be congratulated on the communication he had made, on the patience he had given to the treatment of these cases, and on the assurance with which he had come there and outlined his experiences.

Mr. H. G. WATKIN asked Mr. Williams what was the condition of the lips in these cases. He thought that the permanency or otherwise of the result would depend to a great extent on the position of the lower lip.

The PRESIDENT asked whether, in cases in which there was reluctance to erupt, Mr. Williams had thought of using small doses of thyroid extract. This did speed up the metabolism generally.

Mrs. LINDSAY suggested in cases of tardy eruption something less complicated than thyroid extract might be employed, namely percussion, with an automatic mallet and indiarubber point. The indiarubber stopper from the tubes of novocain tablets fitted on the point of the mallet, were the most handy instruments to percuss over the parts of the jaw where the tooth should erupt.

Mr. HAYTON-WILLIAMS, in reply, said that Mr. Rix had suggested that room should be provided before any attempt at alignment was made. In both the cases he had brought forward he *had* room in which to align the upper incisors. In the second case he had already extracted the temporary canines before attempting alignment. Mr. Cutler had suggested the sharp inclined plane to align the lower incisors. That was a helpful suggestion, which had not occurred to him. Mr. Cutler had also said that it was essential to have expansion at the same time as reaction. But in the cases he had brought forward the expansion was only in the cheek teeth, not in the front teeth. In reply to Mr. Watkin's question about the lips, in each case the patient could bring the lips together quite normally. He would pass on the President's suggestion about thyroid to the family advisers, and he was grateful also for Mrs. Lindsay's suggestion about percussion.

A MEETING of the Society was held on Monday, November 2nd, 1931, the President, Mr. A. T. PITTS, in the chair.

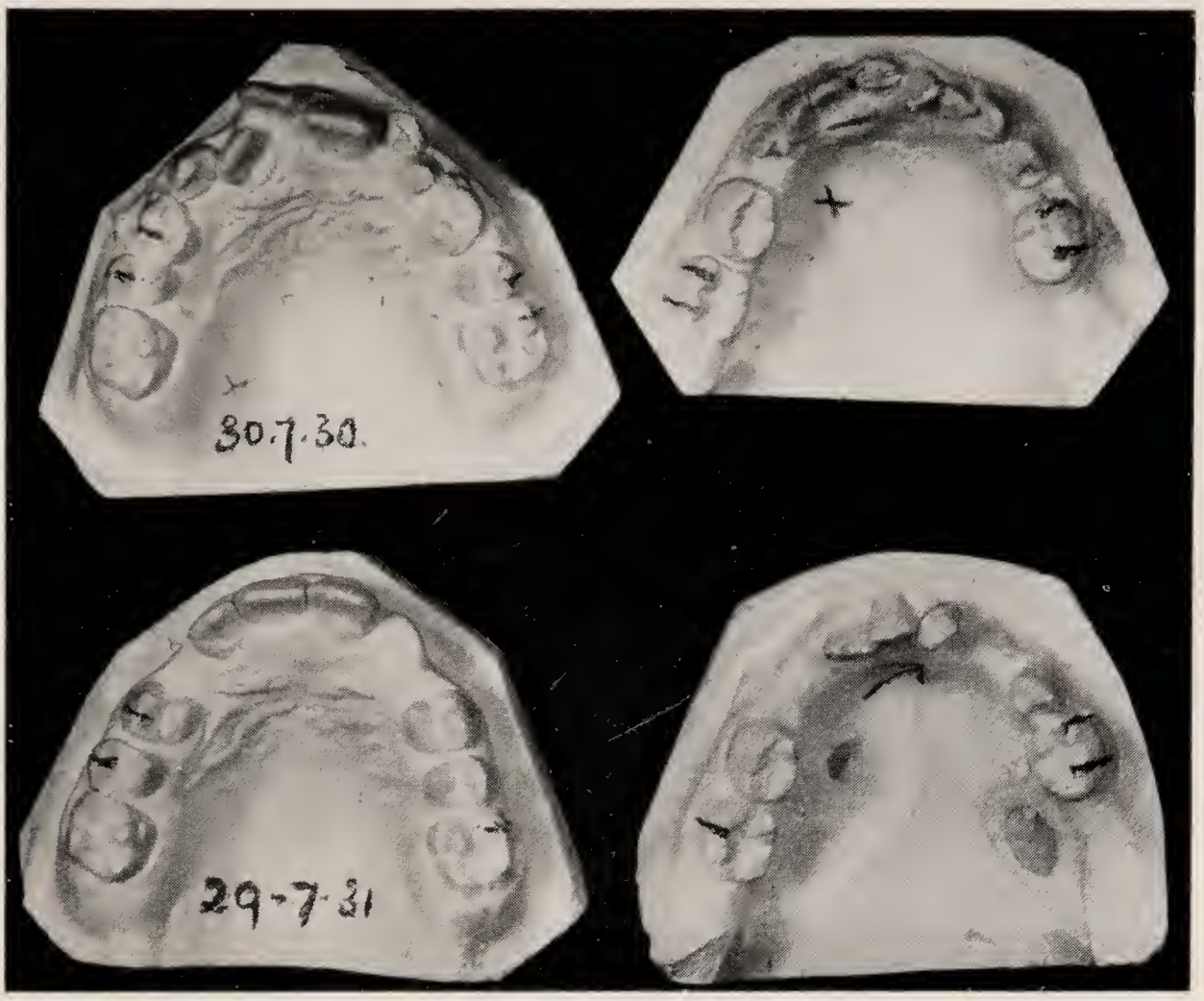
The Hon. SECRETARY read the minutes of the previous meeting, which were adopted.

The gathering then rose in respect to the memory of Mr. J. D. McKechnie, whose death had occurred since the last meeting. The PRESIDENT remarked that Mr. McKechnie had been a member for many years, and suggested that a message of condolence be sent to his relatives. The meeting unanimously agreed to this course.

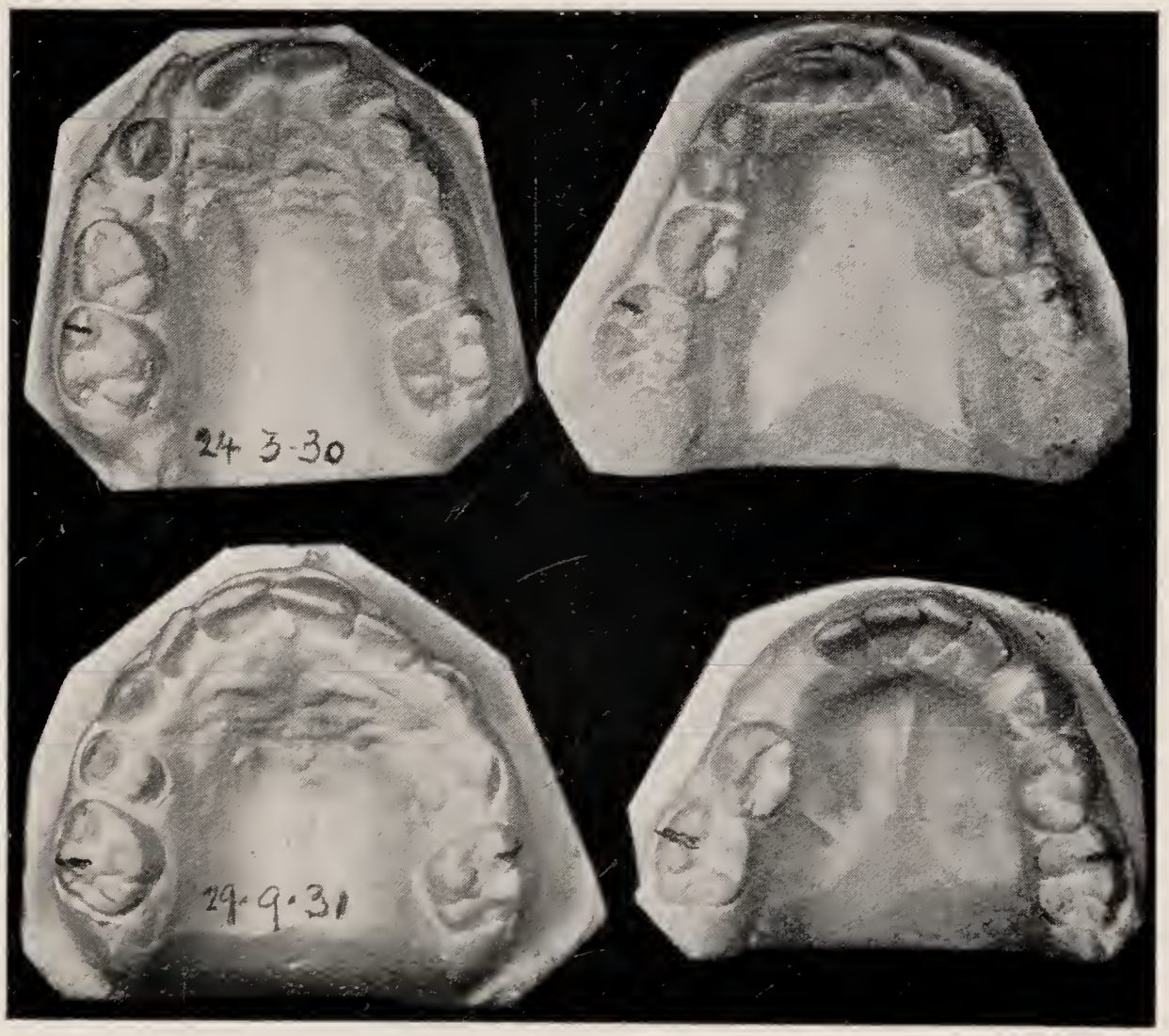
The PRESIDENT extended the customary invitation to the many visitors who were present to consider themselves members for the evening and take part in the discussions.

Papers were read by Mr. J. LEWIN PAYNE, Mr. F. J. WALKER, Dr. C. L. ENDICOTT and Mr. O. N. CATCHPOLE.

Illustrating Mr. HAYTON-WILLIAMS' Communication.

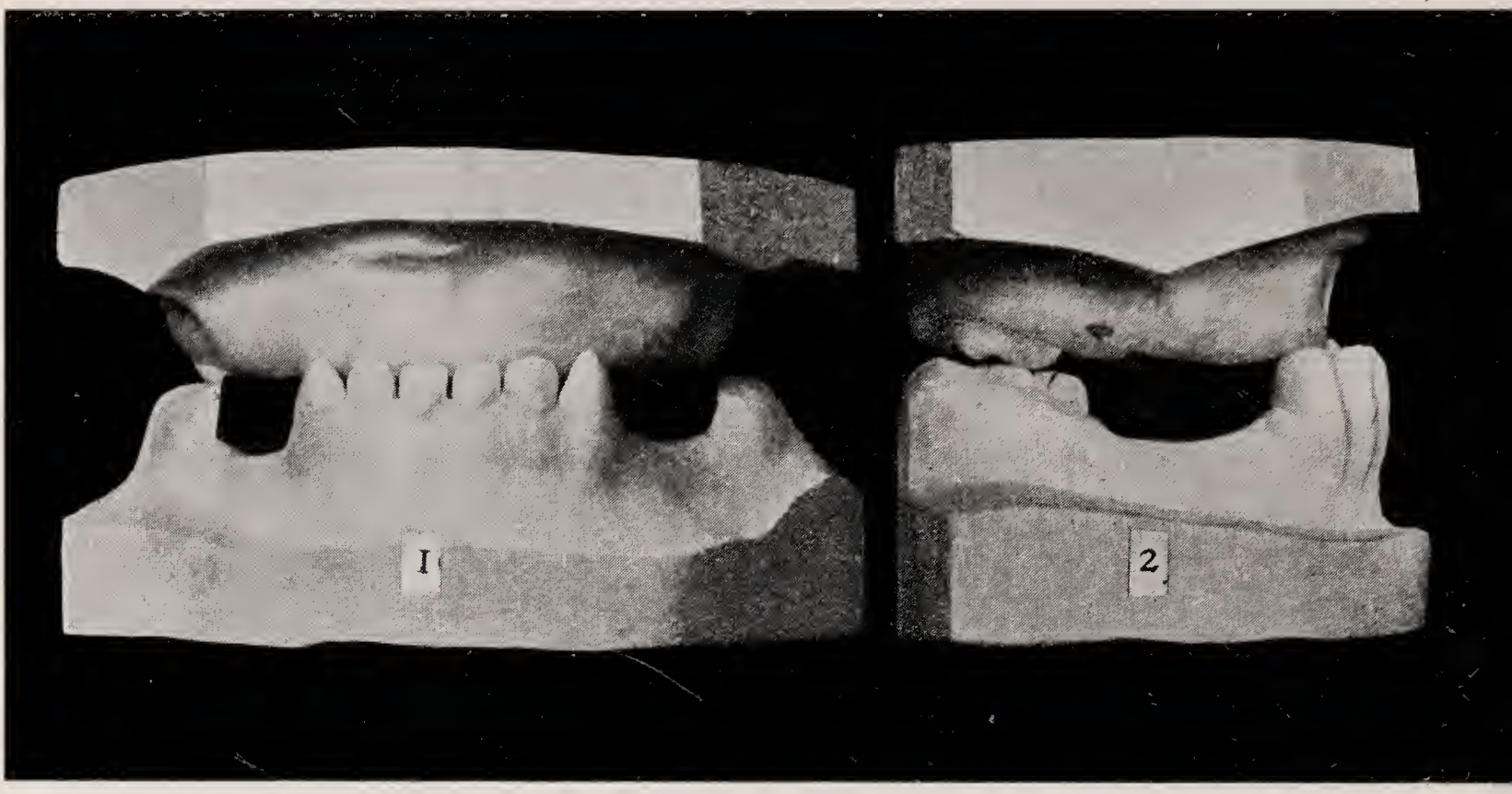


Case 1.



Case 2.

Illustrating Mr. ENDICOTT'S Communication.



AN UNUSUAL CASE OF INFERIOR PROTRUSION. (ANGLE CLASS III.)

By C. L. ENDICOTT, L.D.S.

RECENTLY, the following case has come to my attention: a girl of 6 years of age with an inferior protrusion. About the time of the fifth birthday, that is, a year ago, all of the maxillary deciduous teeth, together with the four mandibular deciduous molars, were removed. The profile indicates a marked lack of vertical development, and a prominent lower lip. The mother states that the protrusion has developed within the last year, and after a careful study of the case, I am inclined to share this view.

The models (Figs. I and II) demonstrate the relation of the dental arches with the remaining mandibular anterior deciduous teeth biting in front of the maxillary ridge. I feel that the child has brought the mandible into this forward relation in search of a comfortable position in which to bite. It is now quite impossible for the patient to retract the mandible to what would seem to be a normal mesio-distal relationship. An X-ray examination revealed the absence of both mandibular second premolars—all other teeth are present, and in the maxilla the premolars are crowded, due to the abnormal forward position of the first permanent molars. The child was breast fed and there is a history of measles at twelve months and influenza at four years of age. By way of interest, a brother of three years possesses a good deciduous dentition, with normal developmental spacing of the incisors. A sister of sixteen years has a fairly normal dentition. These are the only other members of the family that I have had an opportunity of examining. This case has been under our care for but a short time. The method by which I propose to attempt its correction is as follows:—

In the belief that the difficulty of overcoming this condition will increase with the length of time that it exists, and because the permanent teeth are beginning to erupt, I have decided to start at once. Temporarily, a pair of vulcanite plates with inclined planes in the premolar regions have been inserted, the inclines being articulated so as to encourage the posterior movement of the mandible. The lower planes, while sloping from behind forward and downward, slant slightly to the lingual. The upper planes slant in the opposite directions. This arrangement of the planes helps to maintain the correct median line and the lateral relationship. The bite is opened by the planes to allow the first permanent molars to erupt further, and thereby assist in the establishment of a correct vertical relationship. The opening of the bite, now exaggerated, will be reduced as the jaw recedes and the planes pass along one another. During periodic visits the ends of the planes can be ground away as found necessary; so also the vulcanite to permit the teeth to erupt. These plates can probably be dispensed with after the first permanent molars are in occlusion. This appliance is augmented by a chin retractor and headgear joined by elastics.

In conclusion I might state that the child has been wearing the plates for a week and with no apparent discomfort. I should appre-

ciate the opportunity of bringing this case before the society as a future casual communication in the hope that I might be able to show some improvement.

DISCUSSION.

Mrs. MICHAELIS said that the case had been shown to members during the recent post-graduate course at the Eastman Clinic. She had been particularly interested in it then because, in the January issue of the *International Journal of Orthodontics*, Dr. Willett had published three very interesting cases which had seemed to be almost identical with the present one. His children had all been much younger: two had been 3 years old and one 3 years and 3 months; the last had been completely identical with Mr. Endicott's case. It had possessed no upper teeth at all and there had been six lower incisors. Dr. Willett had treated the three cases with complete sets of artificial dentures made by a very ingenious method, and claimed that they had been very successful. The difference between those cases and the present one, of course, was that Dr. Willett's had been more in the nature of preventive orthodontics, whereas the present child's condition had not been recognised until the failure of occlusion, which presumably must come from the loss of so many teeth, was more or less advanced. The speaker asked the lecturer whether he did not think it possible that some form of preventive orthodontics might become more or less standardised, so that children who lost the deciduous teeth early—a loss which Mr. Chapman had always insisted, and which they all knew well, was very detrimental to the formation of the denture—could have the process kept in check, so that the bad result could be averted; not only by space retainers, but by some form of definite denture on the lines of Dr. Willett's, so that the child's normal masticating function would continue unimpaired.

Mr. D. HAYTON-WILLIAMS inquired whether Mr. Endicott did not find that the child had some difficulty in retaining the upper denture in view of the incline of the space. The lower denture would appear fairly stable, but the illustrations gave the impression that the upper denture might shoot forward, especially in view of the fact that the first upper molars were only partially erupted and gave no assistance to the dentures, being, on the contrary, a definite hindrance.

The PRESIDENT asked whether, before the child had erupted its premolars, the upper incisors had been inside the lower; whether the case was really one of an anterior protrusion from the outset, as many such cases were, or whether it was really an induced case and the lower jaw had been brought forward owing to the lack of any biting surface on it.

Mr. WATKIN asked why the upper teeth had been extracted.

Mr. ENDICOTT, in reply to Mrs. Michaelis, stated that the case was of a decidedly new type to him, and the treatment had been very much by way of experiment. He had not read the account of the cases reported by Dr. Willett to the *International Journal*, but had heard about them, and was not at all sure of the result that he would obtain in the present case. It had, nevertheless, been very interesting, and as soon as he had seen it he had immediately wanted to try what he could do to correct the jaw relationship. There was hardly enough material of this kind available to enable anyone to evolve a standardised system of prevention. He had expected difficulty in retaining the upper denture; the child had worn the plates for a week, and he admitted that the upper one was retained with the aid of corega! She had apparently experienced no difficulty so far in keeping it in place. He had, in fact, been very pleasantly surprised. He had not originally intended to present the suggested treatment, because he had not thought that he would have much success with it, but the patient had been progressing with the plates much better than he had anticipated.

In reply to the President, he regretted that he could not answer the question definitely; he admitted, however, that such a condition might have existed before the extraction of the deciduous teeth. He was being guided mainly by the statement of the mother, who insisted that the protrusion had developed since the extraction of those teeth. In answer to Mr. Watkin's question, he replied that the case had been under the care of himself and his colleagues for a very short time, and that he therefore did not know why the teeth had been extracted. He supposed that there had been a great deal of sepsis around the mouth, although the mother had maintained on being questioned that the child had never complained of any toothache.

DEFICIENCY OF TEETH.

By J. Lewin Payne, O.B.E., L.D.S., L.R.C.P., M.R.C.S.

The case here recorded is one of a lady, aged 24, who came to see me complaining of the spacing and irregularity of her teeth and asking whether anything could be done to improve her appearance. Born in the Argentine, she was a small, ill-developed lady, who had married an Englishman.

On examination, I found the following teeth in the mouth :—

Space of 4 mm. (Figs. 1 and 2.)

3 cusps only. 3 cusps only.

	6	5	4	c	b	1	1	b	c	4	5	6
	6	5	- - -	4	c	2	a	-	2	c	4 - - - -	5 6

4 cusps (Carious D. T.) 4 cusps (Occlusal filling.)

The radiographs were taken by a radiologist who was a friend of the patient, but I regret to say that they are not as complete nor as clear as one would wish them to be. They are clear enough however to show that there were no signs of any unerupted teeth lying buried in the jaw and the patient declared that she had not had any extracted. She had only lost those deciduous teeth which fell out without operative assistance.

The special points of interest in this case to which I would like to draw your attention are :—

(Figs. 3, 4, and 5.)

(1) The absence of $\frac{8\ 7\quad 3\ 2 \mid 2\ 3\quad 7\ 8}{8\ 7\quad 3\ 1 \mid 1\ 3\quad 7\ 8}$ that is to say, exactly half the teeth of the normal permanent series are missing.

(2) The fact that the second premolars (which are frequently absent when there is a deficiency of teeth) are all present. Yet, the permanent canines which (with the first molars) are usually considered to be the most constant teeth of the permanent dentition could not be traced.

It would be possible to argue that the teeth I call first permanent molars should be designated as second molars. For, in the mandible these teeth have only four cusps and in the maxilla there are only three well-formed cusps. But, the constancy of the first permanent molars, the position of the teeth, and the nature of the roots are to my mind ample evidence that they are first molar teeth. The right lower molar was badly carious and a " dead " tooth. There is a marked interspace between the upper central incisors measuring 4 millimetres, and between the two lower premolars on the left side a space of $7\frac{1}{2}$ millimetres, whilst on the right side of the mandible the interspace between the premolars measures $3\frac{1}{2}$ millimetres.

It is interesting to note, when a deficiency of molars occurs, the frequency with which the second premolar travels back towards the molar region whilst the first premolar remains tight against the canine. I have always felt that the relationship of the mental foramen to these teeth may play a part in this arrangement.

The question may be asked, why should the development of permanent teeth be partially, or completely, suppressed? I fear that I cannot offer any clear solution to this problem.

Amongst the various causes given in the text books for the absence of teeth one may mention: (1) Failure to erupt due to impaction, or to a total displacement of the formed tooth. (2) Injury, or death, of a developing tooth from trauma or sepsis. (3) Transformation of the tooth germ to an odontome. (Neither of the above apply in the present case.) (4) Congenital absence of the requisite tooth germ. (5) Failure of the tooth germ to calcify.

The fact that some teeth are more regularly missing from the series than others has been suggested as an argument in support of the view that evolutionary changes are taking place which will lead ultimately to a reduction in the number of teeth in the human jaws. But then, against this theory, it may be shown that an excess beyond the normal number of human teeth is more common than a deficiency. Probably both are evolutionary changes illustrative of the universal tendency for variations to occur and that neither of these variations (excess, or diminution) in the number of teeth is of any material advantage to the human race.

Discussion.

Mr. Carl Schelling inquired whether any authority had yet tabulated these deficiencies, which seemed to be very scarce. He had during the previous week seen a young lady, whom he had known ever since she was a child; she had in her upper jaw only two central incisors, the two canines and two molars. He was sure that she had never had any teeth extracted. The remaining teeth were very good. He asked further into what category the deficiencies fell which had been described by Mr. Payne.

Mr. Harold Chapman remarked that in the previous week he had received some models from the Argentine of the dentition of a boy of about 16 years of age who possessed no lower permanent central incisors, but one deciduous lower central incisor in a condition very similar to that described by Mr. Payne. As far as he knew, the boy had no other teeth missing. He recalled a case of considerable deficiency of teeth somewhat similar to the one shown: two upper and lower molars, one on each side, which had erupted, much resembled those in Mr. Payne's case. The academic question arose of whether they were first molars; from the occlusal surface it did not appear that they were. He would be glad of Mr. Payne's opinion of whether they were first or second molars.

Mr. A. L. Packham, after thanking Mr. Payne, asked him to describe more fully the general condition of the patient, and especially that of the hair, eyes and general skeletal development. Many members present would remember that Mr. Payne had read a most interesting paper upon the subject about two years previously under the title of "Cranio-cleido-dysostosis," and the present case, if it had occurred earlier, might have been included in the series which the lecturer had then shown. The speaker recalled the demonstration to the society some years previously a case of asymmetrical absence or non-development of teeth in a girl aged 12; on one side the canine had been absent and on the other the first premolar. It had struck him at the time that this was a very curious and rare condition owing to its asymmetry.

Miss K. C. Smyth requested the lecturer to say a little more about the second premolar, and to suggest why it, and not the first, should have moved back in the mandible. He had mentioned the position of the mental foramen as a factor influencing the movement: in what way did he think it could act? The speaker mentioned that she had seen first premolars tilt backwards, and inquired whether the lecturer considered that in that case the root was stopped by the presence of the compact bone lining the mental foramen, and whether the tooth then inclined, with the mental foramen, or rather the bony canal leading from the foramen, as a fulcrum.

Fig. 1. Fig. 2.

The photographer has shown an open bite. Actually the incisors were in edge-to-edge occlusion.

Fig. 3. Right.

Illustrating Mr. Lewin Payne's Communication.

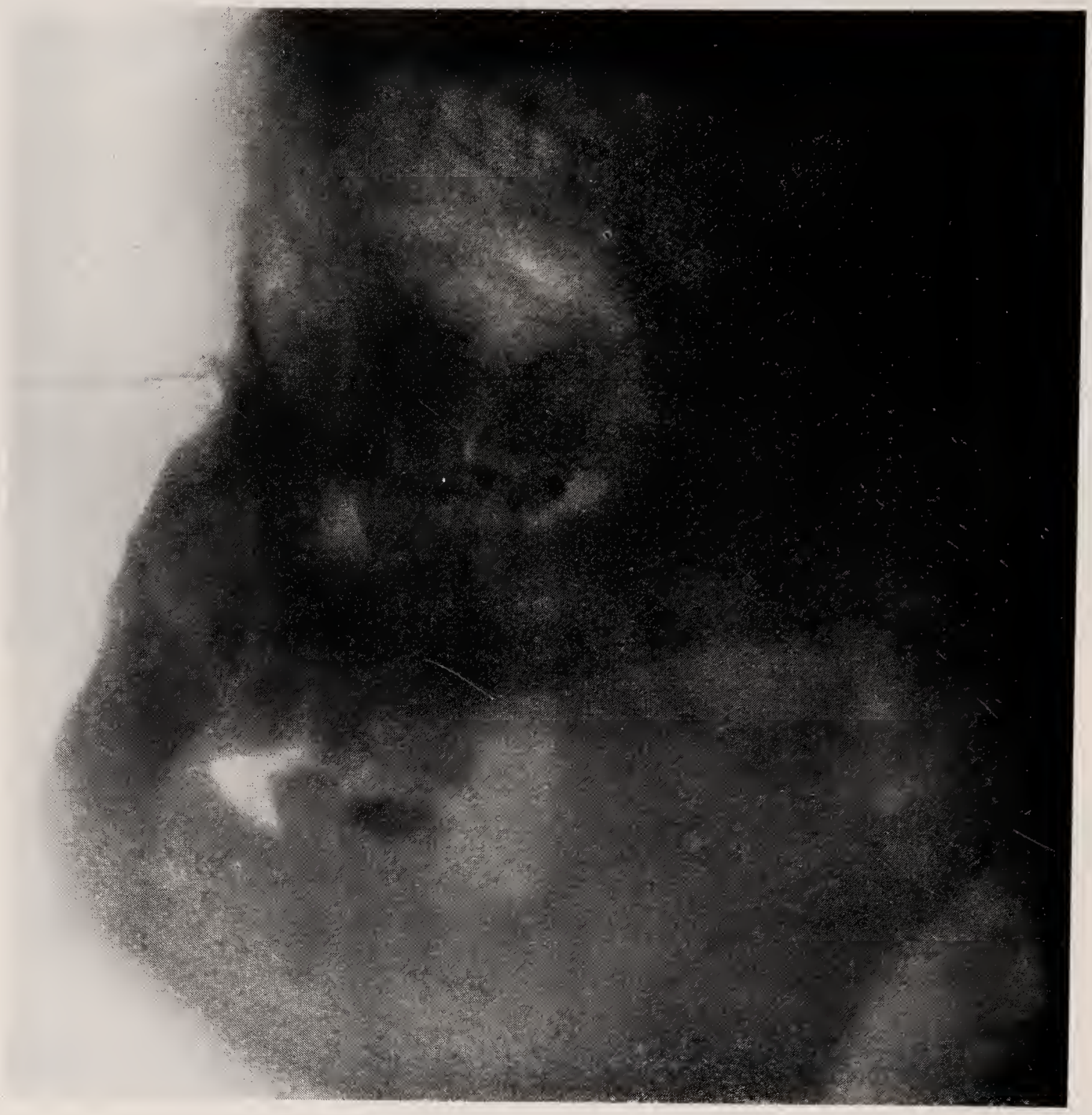


Fig. 4. Left.

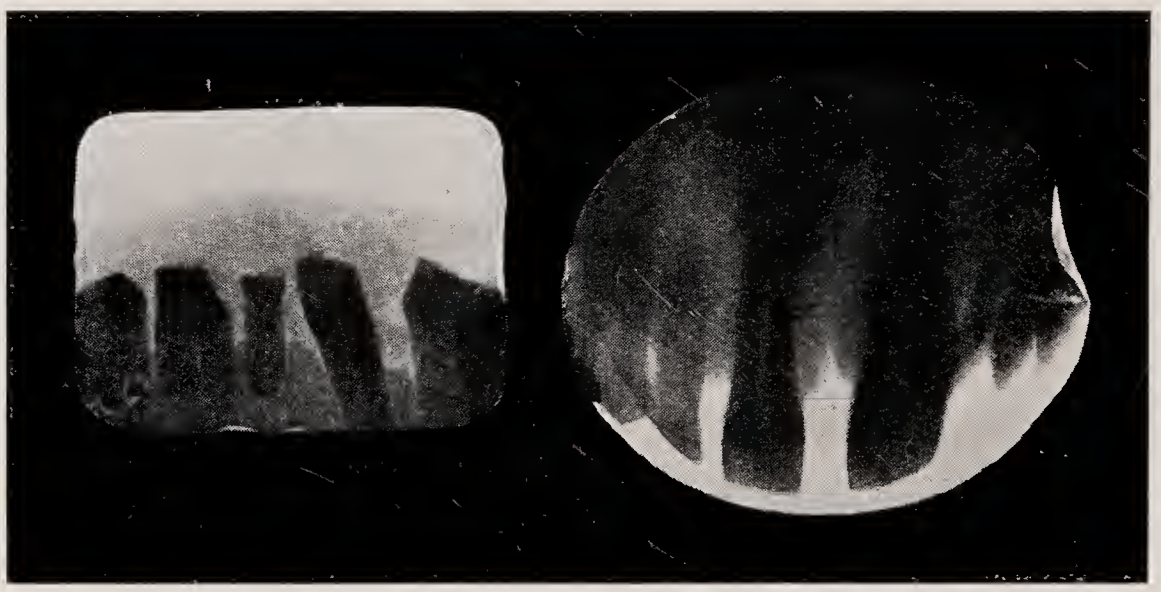


Fig. 5.
Mandibular lateral incisors and deciduous right central.

Fig. 5.
Maxillary central incisors and deciduous laterals.

The PRESIDENT stated that he had always been interested in cases of suppression of teeth, largely because so little was known about them and because they offered such a tremendous field for speculation. He had seen a considerable number, and several of a degree even more extensive than that described by Mr. Payne. He considered that the absence of teeth fell into two groups: one in which certain teeth tended to be absent, the characteristic ones being the laterals, the third molars and the second premolars; and the other, of which the present case appeared to be an example, in which there was a deficiency of all or of a considerable number of the teeth. Mr. Packham had anticipated him in inquiring about other factors. When a considerable number of the teeth were absent the deficiency was no doubt one of the expressions of what had been called the combined major ectodermal defect, and in nearly all cases in his experience it coincided with other abnormalities of the skin, hair, sweat-glands and nails. He had seen three cases of this combination in children: one had been a boy who had had a small face with a wizened expression rather like that of an old man, with small jaws, in which the X-rays had shown that two teeth only were present, which by the irony of fate had been situated respectively in the left upper jaw and in the right lower jaw. There never had been any other teeth and there were not going to be any more. The skin had been dry and harsh and the hair short and scanty and very slow growing; the mother had said that the boy never perspired at all.

Another case had been that of a boy who was a little better off, for he had had five or six rather ill-formed, peg-shaped teeth; he also had abnormalities of the skin and hair. The third case he had observed in one of the wards at Great Ormond Street; the patient had exhibited a very marked deficiency, having only three or four teeth present in the jaw according to the X-rays. In this case also the skin had been dry and harsh. He, the President, had read that in Germany it had been discovered that such cases often led to an absence of sweat glands, so he had asked the house surgeon whether a biopsy could be performed to ascertain whether this deficiency was present; the investigation had been carried out and it had been found that sweat glands were absent in the skin.

Deficiencies were not necessarily present in all the structures: the skin, hair and teeth might be affected and not the nails; or the hair and nails and not the eyes; or the skin, hair and sweat glands might be affected while the teeth remained normal. Nevertheless, all the cases had in common a quite definite defect in development of the ectodermal layer, and it was proper to consider them all as failures of the ectodermal cells to develop. Many cases had been recorded, but often from the point of view of their salient features; a good many, for instance, had been recorded by dermatologists, who had described abnormalities of the skin and nails; some by pediatrists in their transactions; and the dental aspects often tended to be overlooked. If, however, the literature was ransacked, it was surprising how large was the number of cases of this sort that had been recorded. Some worker ought to collect them from all points of view, and then the orthodontist would be able to acquire knowledge of them.

With reference to Mr. Packham's remarks, the President doubted whether the cases that Mr. Payne had recorded at the meeting of the B.S.S.O. in February, 1929, were examples of a similar condition. He suggested that they were cases of cranio-cleido-dysostosis, since the teeth were present and had failed to erupt. About two years before, he had seen a case in which the teeth had all been present, but many of them had not erupted. Since it might be assumed that eruption was a function of the alveolar bone, as demonstrated by Prof. Brash, it appeared that these cases were not an example of an ectodermal, but rather of a mesodermal defect.

Turning to the absence of lateral incisors, second premolars, and third molars, the President remarked that he had always felt that the atavistic explanation, or the theory that the human race was undergoing evolutionary changes, and that in the course of time its dental formula would decrease, was rather hard to follow and constituted somewhat of a strain on the imagination. It was possible that, some hundreds of thousands of years to come, the presence of a lateral incisor would be regarded as an abnormality by the dentists of the day and recorded in the proceedings of some orthodontic society of that time.

In considering the factors governing the selection of these particular teeth for deficiency, it had struck him that the lateral was situated in the neighbourhood of

the maxillo-premaxillary suture. There might be some interruption in the continuity of the tooth band; it would seem that the appearance of the toothband and the joining-up of the premaxilla and maxilla occurred close together, and one might happen before the other. It was quite a possibility that some abnormal stress or strain in that region might easily interfere with the tooth band and lead to the suppression of the lateral incisor. In the third molar we had the end of the tooth band, which terminated in the region where there was a sort of struggle between the ascending ramus and the body of the jaw. There was a definite tendency for the jaw to become shorter, and the end of the tooth band in that region might be interfered with. There were therefore two regions in which considerable stress or strain occurred which might account for the absence of teeth formed in these two areas.

When, however, he tried to link up the second premolar in the same way and speculate why that tooth should be so often absent, he confessed that he was somewhat baffled. Nevertheless, he suggested that some of these cases might be due to injury at the time of the extraction of the second milk molar, or to infection. He had seen cases where, although no attempt at violence had been made, the extraction of the deciduous molar had brought the tooth germ away with it. On the other hand, there were many cases in which the second deciduous molar had been a firmly-implanted tooth in adult life and there had been no sign of the premolar. He could not, however, think of any particular factor which might cause the second premolar to be absent, except that it had occurred to him that it was in the region of the mental foramen, where ossification of the mandible began and where some abnormality in the process of ossification might lead to a disturbance of tooth development at that point.

Concerning the possibility of compiling a pedigree of this deficiency, the President said that he had read in the *Lancet* a notice that the Eugenic Society had published a small pamphlet on how to construct a pedigree. This might be a very useful aid in many cases of inheritance of abnormalities of the teeth and jaws.

Mrs. L. Lindsay described the President's remarks on the lateral incisor as somewhat alarming, if Mr. Kelsey Fry were correct in his suggestion that, when the lateral was suppressed, the children of such a person would have cleft palate. Did the speaker suggest that such a disfigurement would occur in all the descendants of persons with suppression of the lateral incisor?

The President declared that he was not going to say anything of the sort. Mr. Kelsey Fry had referred to the statement by Lucas fifty or sixty years ago, which had been explored by many clinicians and had not been supported by any evidence.

Mr. H. G. Watkin stated that he had encountered several similar cases, and inquired what treatment Mr. Payne proposed—or was carrying out.

Mr. Robert Cutler expressed the opinion that the case, extreme though it might be, was not only of great academic interest, but also susceptible of the most practical application. It must be, he said, within the experience of all the members present to be abruptly faced with the realities of the suppression of teeth in the second dentition. They could all remember cases which they had had under treatment in which the unsuspected absence of certain of the permanent teeth became ultimately disclosed, so that the final mechanical results which they had had in mind might be endangered, while their belated explanations to the parents often spoke ill of their prescience. Mr. Payne had indicated the upper lateral incisors as those which were very frequently absent, and the pair which had the greatest significance to practical orthodontists. It might be extremely interesting to test the opinion of members on the points of the conditions—the signs and symptoms for which they looked to indicate to them the possibility of absence of the upper lateral incisor teeth. It was not given to all orthodontists to be able to take routine X-ray pictures of every case they treated. They usually had to reserve the X-ray for those cases in which there were special indications. As far as the upper lateral incisors were concerned, the speaker thought that there were some very definite indications, at least for an X-ray picture. Those which suggested themselves immediately were, first of all, delay in the eruption of the lateral incisors beyond the normal age period; correlated with that, an undue firmness of the deciduous lateral incisors. Secondly, it was necessary to look

for a lack of the normal fulness of the alveolar bone in that region, and thirdly, the practitioner should inquire for a history of any parental suppression or deformity of the lateral teeth. Fourthly, there was a point which he put forward in all diffidence, because it might be contradicted: a jaw which was apparently crowded—that in which the practitioner saw the upper temporary inter-canine space to be narrow, and in which the central incisors had already erupted. In a case in which the central incisors had erupted and there was a narrow inter-canine space, so that there would not be room for adult laterals, if those central incisors were free from any rotation at all, there was a very great possibility that the laterals were absent. That alone was a strong indication for X-rays. If all four teeth were there, the practitioner would certainly see some degree of torsion of the central incisors.

Logically, the question of treatment should be approached in the following way: if a pair of upper lateral incisors was missing, should a pair be removed from the lower jaw to keep the case in balance, or should the practitioner merely watch the case over a period of years and see how it developed? They all knew the bad results that followed from the extraction of one isolated irregular incisor tooth from the lower jaw during the growth period, 3-11 years. If treatment were attempted afterwards, it seemed rarely possible to make the jaws fit. He invited the thanks of the meeting to Mr. Payne for delivering his communication to it in the midst of his duties as Examiner to the College of Surgeons.

Mr. PAYNE, in reply, after thanking the President and others who had taken part in the discussion, stated that the lady whose case he had described was a small woman of 24 possessing a rough skin, sallow complexion, and excessively dark coarse hair which, however, was plentiful. She had brown eyes, a small face, but the jaws appeared to be normal in form. He agreed with what the President had said concerning the suggested connection of cases of cranio-cleido-dysostosis with the present case. There was no real relationship. In cases of cranio-cleido-dysostosis the teeth were developed but were delayed in their eruption, and in nearly every case the number of teeth was at least equal to normal, and many patients possessed a number in excess of the normal. At any rate, this applied to the cases which he had had the opportunity of examining. There was much to be said for the President's view that the case which he had shown that evening represented an ectodermal defect, whilst examples of cranio-cleido-dysostosis pointed to meso-dermal defects.

In reply to Miss Smyth's question, concerning the movement backwards of the second premolar while the first premolar remained in position, he had suggested in his communication that the relationship of the mental foramen to these teeth might have some bearing upon the matter. He thought that possibly the vascularity of the region, and the fact that it contained the original centre of ossification, might have an influence upon the movement of these two teeth apart, which was so common. The first premolar was nearly always retained against the canine, whereas in some cases the second premolar would move back even more than it had done in the example he had described.

Referring to Mr. Chapman's first case, the speaker said it was a curious coincidence that both the patients should come from the Argentine. He could not say whether it was possible to trace other abnormalities of the same nature to that country. With regard to Mr. Chapman's second case, it was difficult to come to a definite conclusion without seeing the patient and the X-rays, but the chances were greatly in favour of the teeth being first molars.

Mr. Schelling had suggested that these cases should be tabulated. For this purpose they must be recorded. That had been the speaker's reason for bringing this communication forward. He felt that every case of deficiency should be recorded so that a sufficient number for tabulation might be accumulated. Research workers then might be enabled to come to some conclusion as to the causation.

In reply to Mr. Watkin, he stated that his treatment might be considered unorthodox. He had decided to extract the ugly-looking front teeth together with the carious lower first molar. Dentures were fitted subsequently, and he had reason to believe that the patient was much more pleased with them than she had been with her own teeth!

AN APPROACH TO THE TREATMENT OF ADULT DENTO-FACIAL DEFORMITIES.

By F. A. Walker, L.D.S.

As an introduction to this communication may I suggest that where treatment is requested for adult dento-facial deformity, such deformity is so distressingly obvious that it is possible to obtain a spectacular result. As in normal orthodontics, we must consider not only the relation of the dental arches but also the general facial expression.

I am going to show two cases:—

(1) An under development of the mandible, or inferior retrusion aggravated by a slight prominence of the pre-maxillæ.

(2) Over prominence of the pre-maxillæ or superior protrusion.

In the first case the patient was examined in October, 1929, *æt.* 16, wearing an upper retention appliance. It was ascertained that some form of orthodontics had been performed for the previous three years, and there was still a question of further improvement in appearance and in incision of food. (See photographs 1 and 2.) It was felt that any continued treatment on normal orthodontic lines could not meet with success. Consequently it was decided to refer the case to Sir Harold Gillies *re* the advisability and the success of plastic surgery combined with prosthesis to improve the contour of the chin and incisive efficiency. Approving this line of action, Sir Harold then explained the suggested treatment to the patient who expressed her willingness to co-operate. Accordingly a lower cap splint was fixed on January 5th, 1930. This splint was so made to carry a removable horizontal platform anterior to the lower incisors.

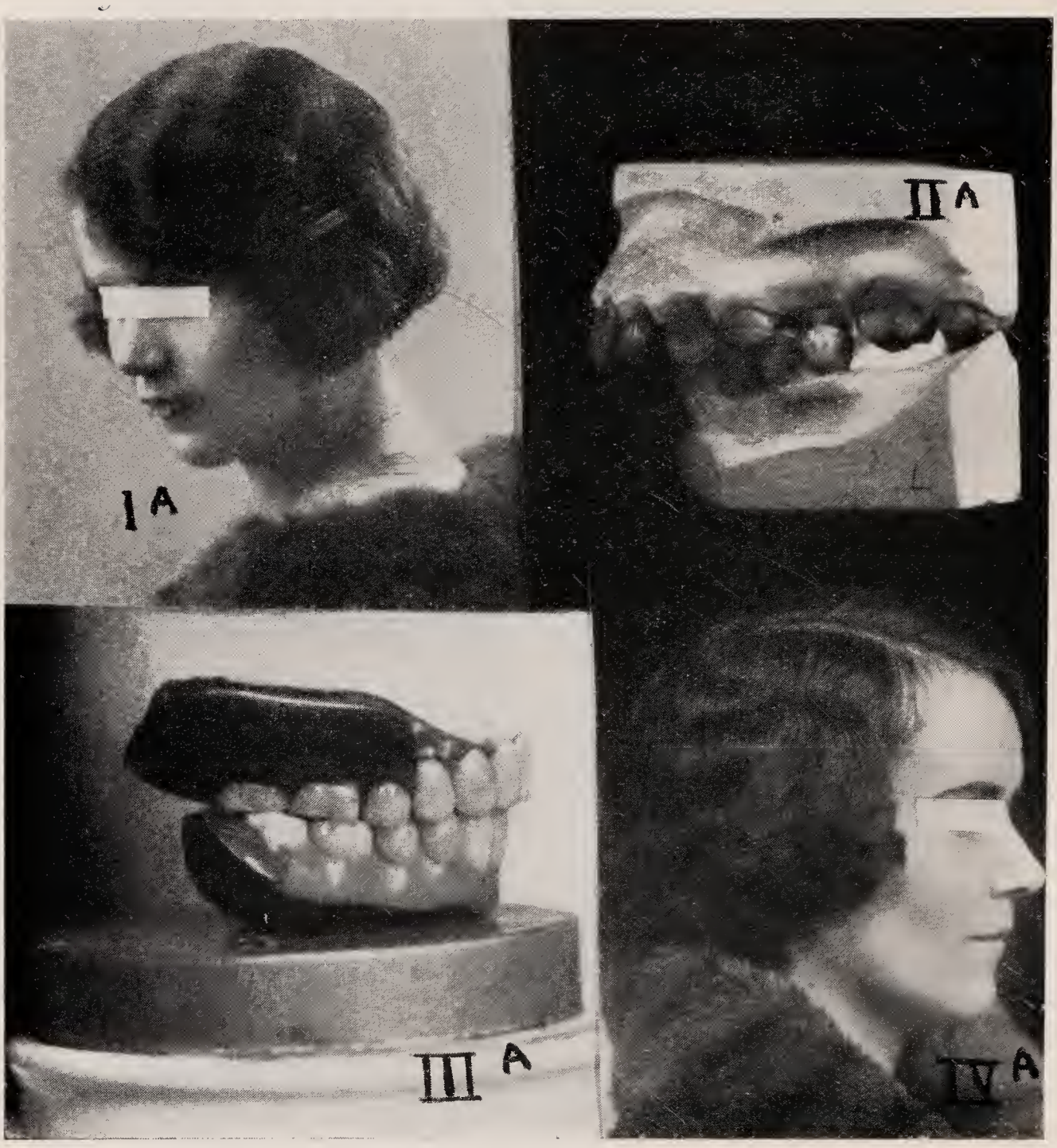
Two days later Sir Harold implanted a Thiersch graft from mental foramen to mental foramen, held in position by "Stent." This "Stent" bung was replaced by a gutta percha bung ten days later. One month after this, the gutta percha was replaced by a removable vulcanite bung. At this date the appearance had been considerably improved, and the condition was more or less stable (i.e. the rapid contraction of the surrounding tissue had finished). One year later, the lower incisors, canines, and premolars were removed. An appliance was then made fitting into the mental trough, and with a view to increasing her incisive efficiency the teeth were placed anterior to the position in which her natural ones had been. (See photographs 3 and 4.)

Patient No. 2.

In the second case, the patient, *æt.* 26, was examined on May 2nd last, when she complained of trouble in a gland in the right inferior mandibular triangle, due to a badly impacted molar. Clinically there was a cervical discoloration of the teeth and a general condition of chronic periodontitis, especially in the lower incisors. The relationship of the dental arches was clearly one of Class II, Div. 1, Angle's Classification, with an extraordinarily close bite. (See photographs IA and IIA.) The teeth and a gross amount of the upper outer anterior alveolar plate, plus a portion of the inner plate, were removed together with the smoothing of the lower alveolus with a bone file,

Illustrating Mr. F. A. WALKER'S Communication.

Illustrating Mr. F. A. Walker's Communication.



under endotracheal ether. Fourteen days later temporary dentures were inserted and after five months, permanent dentures were supplied. (See photographs IIIA and IVA.)

DISCUSSION.

Mr. H. C. VISICK inquired whether, in the first case, if the patient were asked what she thought of it, she would go through it again. The result had been splendid, but he personally would hate the feeling of that great chunk of vulcanite sunk into his flesh. It had looked to him a most gruesome affair. He congratulated Mr. Walker on his results, especially those which he had obtained in the second case.

A MEMBER inquired with what comfort the patient in the first case had worn the apparatus, and how she had used it in mastication ; whether it had been stable. He had noticed some wires on the lower plate ; presumably the speaker had been using some of the posterior teeth to keep the denture in place. What, he inquired, was going to happen when she lost the back teeth ? Would the bottom of the trough take the force of the bite in mastication, or would the denture be kept in place by some other method ?

Mr. CHAPMAN said that when he had seen the title of Mr. Walker's communication he had had visions of a description of such adult cases as had been shown under treatment at the Orthodontic Congress : adults who had been treated more or less in the orthodox manner. It had therefore been somewhat of a surprise to hear the actual communication, which had reminded the speaker very much of a patient whose treatment he had undertaken a couple of years ago. This patient was a boy of 16, and the procedure adopted had been somewhat the reverse of the treatment in Mr. Walker's case. Resection of the mandible had been advised to overcome the extreme post-normality, and the case was very similar to the one under discussion, but worse ; it was important that a good relation of the upper and lower incisors be brought about. The boy had already lost his four first premolars and the gaps remained ; it seemed that less risk would accrue to the patient if an attempt were made to bring back the six anterior teeth rather than to resect the jaw. The speaker was doing this with inter-maxillary force.

Mr. WATKIN recalled a case which he had exhibited two years before, of inferior protrusion. The present case was one of inferior retrusion. He wondered whether resection of the ramus on each side had been thought of. There would then have been a bony support in front and no denture, and it might have been possible to get good occlusion.

Mr. CUTLER remarked that the communication was interesting not only for its subject matter, which could only provoke a most thoughtful discussion, but also because it emanated from one whose election to membership had been confirmed only the previous month. This fact was a very sure indication of the continued virility of the Society, and he hoped that it would long enjoy such support. Mr. Walker, as they all knew, was the director of the prosthetic department at Guy's Hospital—probably the largest in the country—and was very conversant with the relation of prosthetic surgery and surgical technique to the treatment of these adult facial deformities. In the past the speaker had carefully selected models of some of his more successful cases and very casually shown them to Mr. Walker, indicating the way in which orthodontists kept their patients out of the clutches of the prosthetists. Latterly, however, the process had been reversed, and when Mr. Walker had asked him to come and see the two cases which had just been described, he felt that the Society should at once admit Mr. Walker before his technique had become such as to abolish the need for the services of orthodontists altogether. Mr. Walker had by his methods attempted the alleviation of the main symptoms, the prominence of the upper teeth, and the shortening of the mandible. If the two cases were analysed, the second would appear to be a typical Class II, Division I case. The first was not quite typical. The main features were shortness of the mandible from front to back, so that the teeth in the lower jaw were post-normal to the others ; a narrow inter-canine space and excessive incisor overlap. If the ideal treatment were undertaken, an effort was made to stimulate antero-posterior growth of the lower jaw or to bring about a forward bite, in association with the expansion of the upper arch and reduction

of the maxillary protrusion. In many cases the omens were not favourable, and the practitioner contented himself with alleviation of the main symptom, namely the prominence of the upper teeth. As orthodontists, they should do that by taking a pair of teeth out of the upper jaw and retracting all those anterior to them. Mr. Walker had followed out a precisely similar treatment to that used by orthodontists. In the first case, he had done the ideal thing and increased the antero-posterior length of the lower jaw; in the second case he had palliated the main deformity of prominence. Many points arose as to the disadvantages of both treatments. One of the most important was the difficulty in the latter of lip control. The speaker produced some photographs of an arch treated on the lines of palliation of main symptoms. The inter-canine space had been very narrow. The case had been treated by the removal of a pair of premolars, expansion and elevation of the overbite and retraction of the six front teeth in the manner suggested by Mr. Chapman. It might be thought from the model that the result was very good. It was good from the point of view of the bite, which was improved, but there was a very great shortness; the appearance of "toothiness" was almost as bad as ever. Gross shortening was apparent in the upper lip, and the appearance was very little improved. The only way to compensate that defect was to bring the lower lip up to the top, which was of course an unnatural posture, and one which relapsed the moment the child was not being observed. Æsthetically, therefore, the case must be labelled a failure because of the shortness of the upper lip. The speaker inquired whether, when Mr. Walker left the lower incisors, he lifted the lower bite by grinding off some of the tops of the lower incisor teeth, so that the denture when inserted was put to less strain. Mr. Cutler also inquired whether Mr. Walker also removed the four upper incisors or the canines as well, and whether the canine teeth were given much greater width, thus increasing the inter-canine space. The speaker described this work as of boundless promise, especially to general practitioners with a large practice who met unfavourable cases in the less tractable age periods.

Mr. Walker, in reply to Mr. Visick's question of whether the patient would go through the treatment again, said that the first patient was the daughter of a doctor, so that she had not been going into the whole procedure blindfold, and her father had possibly exerted some slight influence. She had been 16 years old when first seen and rather inclined to be a recluse. She was 18 in the last photograph, and was living a more or less normal life; she had a circle of friends and was developing generally. The enormous bung of vulcanite did not seem to enter at all into her mind as uncomfortable; as for stability, the speaker added that the lower denture was the most stable that he had ever met. The lower incisors could be pushed as hard as possible, and it was actually the anterior aspect of the mandible that took all the strain. The denture did not sink and push the chin further down. The clasps that could be seen on the denture had been fitted because, when the speaker had started the treatment, he had anticipated a difficulty that when the patient started to incise her food the back of the denture would rise. He had, he said, just explained that no such response had occurred, and that the clasps were now entirely unnecessary, but they were there to prevent any sinking that might occur in the permanent denture. He was about to do away with them and substitute short studs coming on to the molars.

Mr. Cutler had wished to know whether four incisors would be removed in certain cases, or the canines. The difficulty, when one merely removed the two centrals and the two laterals, was an unsightly square appearance between the canines, and it was very hard to make any arrangement look moderately natural in these conditions. He would therefore probably favour not only the removal of the canines but also of the premolars. There again he would probably do some slight form of alveolectomy, so as to keep the curve and contour of the upper anterior alveolar crest.

AN EXTRA FEATURE WHEN DECIDING TREATMENT.

By O. N. Catchpole, L.D.S.

Contrary to the usual custom of bringing to your notice results obtained by one method or another, I being young in the practice of

orthodontics have few such results to draw upon, so I present to you a case that I am just commencing.

This is of a boy aged 9 years, 3 months. He is an Angle's Class I, with two narrow arches. Of the deciduous teeth the C D and E are present, upper and lower both sides, and the mouth generally is in a very healthy condition. Of the permanent teeth the two upper centrals are erupted, the left slightly bulging forwards, and three of the lower incisors. The interesting feature from our point of view, and from the point of view of treatment, is the fact that the lower right lateral is missing. This was extracted some twelve months ago, as it was instanding and there appeared not to be sufficient room for it to come into line. X-rays have been taken and all the other permanent teeth appear to be present. Since the extraction of the right lower lateral incisor the left one has erupted, and, as it is to be expected, the two centrals have moved to the right. (Epidiascope models were shown.) The lower left lateral has erupted inside the arch and even if and when the two centrals have moved as far as they can to the right, there will still be barely room for this instanding lower left lateral to come into line. I have said that this is an Angle's Class I. On the right side you will notice that the molar relationship is correct, but on the left side there is a tendency to post-normality. Curiously enough the centre line of the upper has also moved to the right. I can see no reason for this except that possibly the left lateral is a little further down than the right. At the moment there is very little room for the upper right lateral and hardly enough for the left. The child was brought to me because of the slight prominence of the upper left central and the instanding lower lateral.

I think that it will be agreed that as the lower arch has lost one of its units, to obtain proper relationship between the two arches the size of the upper arch must be decreased by a slightly larger amount, and to obtain this there is the option of extracting either the upper right lateral or the upper right first premolar. The simpler course, I think, would be to extract the lateral. Thus, at the expense of the symmetry of the front of the mouth, the whole of the masticating surface would be maintained and also the necessary reduction in size, but as apparatus will have to be worn to expand the lower arch, I am of opinion that the better way is to extract the upper first premolar and put in apparatus in the upper to steer the right lateral and canine into place if necessary. As a basis for your remarks, gentlemen, I will outline the treatment upon which I have decided.

Into the lower I am fitting a lingual bow to expand the arch sufficiently to take the instanding lateral. In the upper I shall first extract the two deciduous canines to give room for the laterals to erupt and then carefully watch the case. I am hoping that the upper will expand with the lower, but if it does not I shall expand it with a palatal bow. Of course, particular attention will have to be paid to the spaces to see that they are not lost. As soon as the first upper right premolar appears I shall extract it and steer the lateral and canine into place if necessary.

Discussion.

Mr. Bertram Samuel remarked that without handling the models or seeing he patient it was difficult to give any opinion other than that advanced by Mr.

Catchpole. Speaking of the treatment, he considered that it was usually a mistake to extract deciduous canines, because although an improvement was very often secured at the time in the lateral incisor region, the extraction operation merely postponed the trouble for a year or two, for the permanent canines were then unable to erupt into place. It had struck him that the deciduous teeth, especially the deciduous molars of the upper jaw, were particularly large in this case, and gave the lecturer quite a lot of space for the eruption of the permanent successors.

Mr. CHAPMAN agreed in general with the treatment that Mr. Catchpole had outlined, but thought that he himself would not remove the lower deciduous canine on the left side; it would be better to keep it, in order that the erupting lateral might tend to force the other teeth over to the side from which the tooth had been removed. In considering the removal of the lateral or premolar, the points which he usually took into consideration—because he was not at all averse to removing a lateral if it were advantageous from all points of view—were: (1) If the lateral were very much rotated or carious, he would consider very seriously the removal of that tooth; (2) another point, which he had only noticed in the last two or three years, to consider, was the position of the permanent canine which was not infrequently very much forward; instead of being over the deciduous canine it was over the permanent lateral. Such cases were very ugly and difficult, therefore he felt inclined to remove the lateral rather than the first premolar, in order to facilitate obtaining a satisfactory result in a comparatively short time.

Mr. CATCHPOLE, replying, said that he was pleased that he had brought the case at its beginning rather than at its end, so that he could take advantage of the advice that he had received. He had certainly decided to take out the two deciduous canines; he had not done so yet. In considering the means of getting the two centrals back again, he had thought that he would have to keep them to one side; he was only extracting one of the permanent teeth, on the side from which the lower lateral was missing. He would have to bring the two centrals over a little, and therefore had no desire to fetch them back to the mid-line again.

THE Annual General Meeting of the Society was held at 28, Portland Place, W., on Monday, December 7th, 1931. Mr. A. T. PITTS, D.S.O. (President) was in the chair.

The minutes of the last meeting were confirmed, and the candidates whose names were on the agenda paper were all elected unanimously by show of hands.

The PRESIDENT announced that the officers and members of Council nominated by the Council whose names were set out were elected, no other nominations having been received, so that a ballot was unnecessary.

Officers and Councillors for 1932—President, Mr. Carl Schelling; Immediate Past President, Mr. A. T. Pitts; Vice-Presidents, Mr. B. Samuel, Mr. H. G. Watkin, Mr. A. L. Packham; Secretary, Mr. R. Cutler; Treasurer, Mr. H. R. Evans; Curator, Mr. H. C. Highton; Librarian, Mr. S. A. Riddett; Editor, Mrs. L. Lindsay; Councillors, Mr. F. B. Bull, Mr. S. St. J. Steadman, Miss K. C. Smyth.

Mr. Bernard Rilot and Mr. Rix were elected Auditors.

SIR NORMAN BENNETT opened a discussion on :—

THE PSYCHOLOGY OF ORTHODONTIC TREATMENT.

By SIR NORMAN BENNETT, M.B., B.CH., L.D.S.

IN choosing a title for a paper, the more logical course is to decide on one, as nearly descriptive as possible, after writing the paper, but as I was pressed to give a title when I had only vague notions in my mind of what I was going to say, I found when I came to think the matter out, that I could not live up to the title, and I must ask you therefore to pass over its seeming magniloquence and listen as patiently as may be to the ordinary ideas which I propose to place before you.

When an orthodontist is contemplating the treatment of a case, there are many factors that he has to take into consideration: his own attitude towards the child, the child's character, the character of the mother, her relations with the child and her estimate of the value and difficulties of orthodontics, the nature of the abnormality, its diagnosis and prognosis, the age of the patient, physical development of bone and muscle, the condition of the teeth and gums, nasal obstruction, and the school arrangements of the child and the probable attitude of the school authorities. Now all these considerations are dealt with in text-books on orthodontics, and the largest amount of space is quite rightly devoted to the more strictly orthodontic part of the problem and closely related factors, because the varieties of abnormality and their causes are so great and so numerous that much space is necessary for their description and elucidation. The other factors are usually polished off in a page or two. We are told that it is no use to attempt treatment unless the child is amenable, and that the mother's co-operation must be secured, or her interference prevented, and so forth. But the amount of space devoted to different aspects of the orthodontic problems must not, I think, be taken as a measure of their relative value. What I want to put before you is that although correct diagnosis and schemes of treatment are of vital importance, in a large number of cases it is, or should be, the child who carries out the treatment, and success or failure depends more upon obtaining its co-operation than on any other factor. We may think of individual teeth, and the movement which it is desired to effect. We know that a given pressure in a given direction will produce a particular result. The problem is how best to apply that pressure, and to maintain it, or re-apply it when tooth-movement has abolished it. We should all like to have our patients under constant supervision, so that the little adjustment necessary from time to time might be given when it is immediately required, but in my experience this is almost always impossible. It often falls to my lot to decide whether it is worth while to treat children who live out of London, who are away at boarding-schools, and who can only come to see me occasionally. In most of such cases much can, I think, be done, and it is usually worth while, provided the interest and the co-operation of the child can be secured. By this I mean much more than taking advantage of the tractability of the child. Most appliances need adjustment ; one may often enlist the help of local dentists with advantage, but I am afraid that this assistance sometimes proves a broken reed upon which to lean. I prefer to use an appliance which the child can adjust, and in making up my mind what sort of an appliance I will use, I have this in mind as the chief determining factor. It is not difficult to move teeth, and there are many ways of moving them, but it is difficult to arrange and ensure that the force necessary for movement shall be applied to the correct degree at the right moments. To get this done by the child implies a great deal more than taking advantage of the amenability produced by parental training. It means making friends with the child and inducing in the child's mind more than a mere willingness to carry out instructions, rather a desire to attain success, and a feeling of reluctance to return later and allow it to be discovered that little or nothing has been achieved. Children have

receptive minds—they are often quicker at understanding what is to be done than their parents. They are usually very adaptable and will wear even uncomfortable appliances put in the mouth, but anything less than complete honesty and frankness in dealing with them is worse than useless. It is of no use to tell a child that an appliance put in for the first time is not uncomfortable because the child and the orthodontist both know that this is untrue, and each knows that the other knows ; but if you explain to the child that it will not hurt, or ought not to hurt, and that if it does he must come and tell you ; but that it will be uncomfortable for three or four days, and that after that he will not mind it a bit, then his pride is called upon, he discovers that you are telling the truth, and you have gone a long way to ensure adequate co-operation. I daresay these ideas are all platitudes, but I think this psychological factor in orthodontic treatment is often neglected. If the operator and the child are sympathetically imbued with the will to succeed, then given a sufficiency of diagnostic accuracy to prevent attempting the impossible, and of technical skill, a reasonable measure of success is almost assured. This perhaps rather borders on the mystical. It is, however, believed by many people that in cases of severe illness, the will to recover is an important factor. This idea is often utilised by popular novelists. The heroine at her last gasp in the last chapter is just able to recognise her lover who has returned from the other side of the world just in time to assure her that she was quite mistaken in thinking that he had gone off with the other girl, and she promptly recovers. But I think it is not only in novels that such things happen. Depressed or morbid mental states can apparently produce physical changes, and determined optimism may help to promote recovery from illness. I am not proposing to argue that will-power will move a tooth from one part of the mouth to another, but on the other hand the application of the force is but the instrument or agent, and I am not prepared to admit that the chain of events from the directive mind of the orthodontist through the child's mind and will, and the control of appliances, ending in the movement of a tooth is a purely mechanical one. I will presently give examples of methods of treatment in which the child's will is quite definitely the determining factor in success.

Now, as regards the mother (it is usually the mother that we have to deal with), I think that her part has for the most part been finished by the time she brings the child to the orthodontist. As a rule, but not always, you may judge pretty well what the child will be like if you know the mother. Early training—very early training—is of vital importance, and a hopelessly spoilt child may be given up at once. I have one such child in mind. She is wearing a simple appliance to raise the bite. When I say wearing, I mean that she wears it when she feels inclined. The mother recently said that it was difficult to bring the child up from the country sufficiently often, and might she go sometimes to the local dentist. I managed to dissemble my joy sufficiently to say in a matter of fact tone that I should be glad to write to the local dentist. Conscience and professional sympathy compelled me to warn him. Fortunately very few children are like that, because the modern well-educated young mother is much to be admired. Her affection is tempered by common sense, she is

keen about the physical development of her children, she knows that there is no easy road to success, and she trains her children to have the same self-control that she has acquired herself, and to see things through. This is what I mean when I say that her work is largely done by the time she brings the child. Her assistance will still be valuable, but the relations between the orthodontist and the child should for the most part be direct, and not through the mother as an intermediary. I attach much importance to that. For example, when posting a removable appliance I always address it to the child rather than to parent or schoolmaster. This is a small matter but I think it counts. As an example of what can be done by the modern mother in creating in the child's mind a favourable attitude towards the dental surgeon, let me tell you a little story. A patient whom I have known since she was a little child has two children, a boy and a girl aged 7 and 5. I have never seen them because they have until lately lived in the north of England. The other day the mother was coming to town to see me, and the little girl announced that she had tooth-ache ; on inquiry this seemed to be rather vague ; the small boy concluded the matter by joining in the conversation and saying to his sister, " I know what you want ; it is just an excuse to go to London with Mummy and see Norman the dentist." General inferences may be drawn from this story, but the one I want to emphasise is that the mother had done her share in trying to make her children amenable patients.

As a contrast to the difficult child that I mentioned just now, let me tell you of another, an extraordinarily nice boy whom I can only see very occasionally—he lives in Devonshire and was at school in Kent until recently. He arrived the other day with a Badcock expansion plate in two halves, and explained to me that by sticking the end of the screw into the tube he could jam it home in his mouth and it would hold all right. Fortunately the two halves were connected with a labial wire, which I usually use because I dislike my children to swallow or half-swallow their plates. On another occasion he wore a broken lower retention plate in two halves, and surrendered it with reluctance to his mother, when she visited him at school, to send to me to repair. Of course, with a boy like that, to fail would be almost a proof of incompetence, and it is with relief that I venture to tell you that the case promises to be a success.

I said just now that it would be unwise to estimate the relative importance of different factors in orthodontic treatment by the amount of space devoted to them in text-books. Similarly, the length of description of the various kinds of abnormality of position affords no criterion of the frequency with which we meet with them in daily practice. Let us consider them from that aspect. Take first of all the abnormalities due to local causes, such as retained deciduous teeth, teeth of abnormal form, supernumeraries, absent teeth, abnormal frænum labii, total displacement in the crypt, impaction of the upper first permanent molar against the second deciduous molar, and thumb or finger sucking. Now most of these things may be seen fairly often in hospital practice ; some of them give rise to gross local deformity ; others to very little. But in good class private patients such as throng the waiting-rooms of the members of this Society, they are rather rare.

Deciduous teeth are removed before they can do much harm, and so are supernumeraries. Abnormal frænum is surgically treated, and thumb sucking is not allowed. When we turn to the difficulties arising from premature loss of deciduous or permanent teeth the case is rather different. These occur fairly often. The deformities arising from loss of teeth anterior to the second deciduous molars are not usually very serious, though I agree that collapse of the arch may cause some difficulty. Forward movement of the first permanent molars is of course responsible for malalignment of the permanent teeth anterior to them. The treatment of such cases when uncomplicated by deficient bone-development or error of occlusion, resolves itself mainly into a choice between moving the molars back again and extraction of premolars, and in most of such cases the wise orthodontist chooses extraction, because this treatment offers the opportunity of providing a good functional occlusion, and the individual tooth-movement required is fairly easy, and can be effected by means of fixed or removable appliances in a short time, without the harm which is liable to result from prolonged treatment or movement through considerable distances.

The next class of case that we may review is that generally known as Angle's Class I, that is to say, malalignment of several teeth due to deficient bone-development, sometimes known as " general crowding." I do not think that general crowding is a good term because it implies too much tooth, or too many teeth rather than insufficient bone. When we say that a bus is over-crowded we mean that too many people have got into it, not that the bus is smaller than usual. " General crowding " would apply strictly to the presence of supernumeraries, which are the real strap-hangers of the dentition. However, that is by the way. What we are considering at the moment is the relative frequency of these various conditions, and I think this particular one is fairly common in all classes of society, and sometimes presents difficulties in treatment greater than in the cases of occlusal abnormality to be presently discussed. They present difficulties in diagnosis, because they involve estimation of whether, what Lundström calls the apical base, is, or ever will be, large enough for a dental arch of anything like canonical form, and therefore whether extraction is necessary as part of the treatment. They are difficult in treatment because a considerable amount of individual tooth-movement is often required and the space within which it can be effected is limited. It seems to me that it is in cases of this class that fixed appliances have an advantage over removable appliances when they are practicable on other grounds. Expansion is often needed and this can be done by means of either fixed or removable appliances. For my part, where the patient is away for two or three months at a time, I prefer the Badcock screw, but that may be a matter of personal predilection. For the individual tooth-movements, especially rotation, probably more definite and more certain results can be obtained by means of fixed appliances. I seem to be dangerously near the point of discussing whether fixed appliances are better than removable. Nothing is farther from my intention. I should as soon think of arguing that roast ribs of beef was a better diet for a rowing Blue than roast saddle of mutton. I believe that some movements are better effected by one and some by the

other and that many other considerations come in for each case, which must be judged on its merits, and that the general predilection of the operator rightly counts for a good deal, because he is likely to achieve the best results with the method of his particular fancy.

This brings me to the large group of cases involving errors of occlusion not merely of individual teeth but of the dental arches as a whole. They include close bite and open bite, post-normal and pre-normal mandibular occlusion, and lateral malocclusion. The last, commonly known as cross-bite, is rather rare, though not very rare. (I am not of course speaking of lateral malocclusion of individual teeth.) I think we may leave it out of the present count. Open bite I have seen many times at hospital, but as regards private practice to-day, it scarcely exists. Its constant association with hypoplasia suggests that the particular defect in the calcification of the teeth and bone is due to a common cause which has become almost eliminated from children whose early nurture is on rational lines. Pre-normal mandibular occlusion is undoubtedly rare, both in private and hospital practice.

This brings me to what I have been leading up to for some time. Close bite and post-normal mandibular occlusion are both exceedingly common, whatever the causes may be. I have not analysed or counted my cases, but I hazard the statement that in private practice at least half of the cases that call for treatment by means of appliances are either close bite or post-normal occlusion or both combined, and I propose further to try to show that in the treatment of these cases the psychological element is or should be of very great importance.

Now, it will be generally admitted that the operation of raising the bite is or has been attended with a good deal of uncertainty. In some cases the bite rises beautifully in a few months ; in others nothing seems to happen. Why ? I believe that there are two essential conditions. One is that the bite should be raised on the lower front teeth only enough just to separate the back teeth. The other is that the effect is produced during mastication and practically at no other time. For these purposes I believe there is nothing so good as a removable vulcanite plate with a thin cast-gold front properly occluded with the lower incisors. This can be slightly thickened as often as necessary ; if it is properly used it will almost always be effective, but success depends on the co-operation of the child, and therefore on the psychological element in the case. I find it very difficult to understand how for this purpose (except on the ground that it cannot be removed) any one can prefer a sort of gridiron arrangement, which cannot be finely adjusted to the bite, and cannot be slightly increased in thickness without removal and much difficulty.

Again, in the case of post-normal mandible it will be agreed that the results, and the permanency of the results, vary widely. Good results can be obtained by means of either intermaxillary force or an inclined plane on a removable appliance, but I venture to submit the argument that the latter method is the more scientific. We know that some mandibles come forward or grow forward very readily, while others do not. Expansion of the maxillary arch or, in younger children, labial movement of the upper central incisors will sometimes effect such a release that but little further treatment is required.

In others the mandible has to be persuaded, and many would say forcibly persuaded. I think we may consider here what is done in orthopædic treatment. I believe it is an accepted principle among orthopædists that as a general rule bony deformities are due to muscular weakness or lack of balance between opposing muscular systems ; and that such a deformity as knock-knees or scoliosis is best cured by remedying the muscular disability. It was found in the case of war injuries that the restoration of palsied muscles to functional activity could not be effected entirely by passive treatment, but that conscious effort on the part of the patient was necessary. So also in the case of knock-knees, the surgeon attaches much importance to the conscious efforts of the child. Now, if there is a bone which is more clearly under the control of muscular effort than another, it is the mandible. We do not quite know what happens when the occlusion is changed, but presumably the normal growth of the condyle backwards is accelerated. I do not think that the resting position of the condyle is permanently altered. However that may be, there is proof enough and to spare that the occlusion can be permanently changed, and I think there is no doubt that the mandible is brought forward. It has been argued that what really happens is that all the lower teeth move forward in the mandible, but surely that is contrary to all observation, and *prima facie* a more unlikely explanation of what happens than changes at the articulation. Now the question arises: How is the change best effected ? There is the method of intermaxillary force, and the method of persuasion by means of an inclined plane. The former undoubtedly acts, but is it physiological and scientific ? It is a passive dragging in which the volition of the patient plays no part. The inclined plane on the other hand is merely a stimulus or a reminder to the patient to do his share. I have no use for large planes shod with gold which force the patient to bite into normal occlusion straight away or to bite not at all. They should be small, oblique in shape, and at the outset should only aim at bringing the mandible forward a little distance. I say they should serve as reminders, because an important factor in treatment is to create incisor-consciousness in the child's mind and to induce him by voluntary muscular action to bring his jaw forward as much and as often as possible. I submit that results achieved by those means are more likely to remain permanent and more likely to be accompanied by compensating physiological changes in the tissue than when they are obtained by any kind of external main force.

I must admit that I seem to be arguing in favour of removable appliances. That is not my object, for fixed appliances are of inestimable value for certain purposes. What I do say is that fixed appliances for the most part ignore the psychological element and the active co-operation of the patient ; and for those forms of treatment so often required, such as for close bite and post-normal mandible, not only can this factor in treatment be best utilised with very simple removable appliances, but the method may be regarded as more scientific, and the results possibly more permanent. I agree, however, that with very young patients one cannot expect the active co-operation that one looks for in older children.

There are two cases that I propose to show you on the screen.

Both may be regarded as successes. They are not necessarily either exceptional or typical of my efforts. Cases are sometimes divided up into successes and failures. It seems to me that most cases come into neither category. Real failures under reasonable conditions should, I think, be rare, but for the most part perfect successes elude me. Orthodontic cases seem to me to have a queer way of doing very little for some time, then progressing rather fast, and then slowing down just when they seem near completion, and often never quite getting there at all.

Nevertheless, I should say that perfect success is not the criterion upon which judgment should be based. An immense number of cases can be greatly improved in one way or another. There is a growing demand for orthodontic treatment, and it will have to be met either by a larger number of orthodontic specialists or by greater attention being paid to the subject by general dental practitioners, or by both means. I think that what perhaps frightens the general practitioner most is reading text-books on orthodontics. Fortunately, in recent years there has been a movement towards simplification of appliances. I noticed with pleasure the other day that Mr. Cale Matthews, when demonstrating here, gave a short list of pliers, band-material, wire, etc., and said boldly "that is all that is necessary." The crucial test of the orthodontist is not the ingenuity displayed in devising complicated appliances, but the ability to obtain results with simple ones. The need for the student of to-day is to be taught as far as we know it, the causation and grouping of abnormalities of position, the principles of diagnosis, and the means and objects of treatment ; the occasional difficult and complicated case should never be used for teaching purposes. He would then discover that 90 per cent. of cases resolve themselves into a few classes, and are not so difficult after all. The choice of the broad lines of treatment is half the battle. Working against nature or striving for an artificial man-made idea is in my opinion to court failure, or indeed in some cases to obtain the sort of success which would have been better avoided. Until means are found for the prevention of the deformities with which we deal, there will always be room for the orthodontic specialist, but ideal occlusion and perfect alignment are but a vain dream for the thousands of children for whom much could be done by the general dental practitioner who had been taught the broad principles of diagnosis and choice of methods of treatment by simple fixed or removable appliances without prejudice in favour of either. Ability to form a sound diagnosis and to formulate a scheme of treatment and to estimate the possibilities of success, come with experience. Better results will be obtained by working on physiological lines with simple appliances, than by attempting the creation of artificial arch-forms by means of complicated ones.

Discussion.

Mr. J. H. Badcock said that Sir Norman Bennett had given the wise and humorous address, full of common sense, which they had learned to expect from him. What he had said about gaining the co-operation of the child would appeal to them all. If, as he had said, the treatment was to be left largely in the hands of the child, it must be on simple lines and of such a nature as the child could

manipulate, and this was all the more necessary in this country because of the difficulties involved in the fact that the children who were their patients so largely, went to boarding schools, and it was only possible to see them at long intervals. With regard to the details of the paper, there were one or two points he desired to mention. One was with regard to Sir Norman's use of the biting-plate. He thoroughly agreed with him that the biting-plate should at first only keep the molars off each other, and should be increased by small stages, so that it did not interfere with the child's comfort or masticating power. There were one or two points he would like to discuss with him with regard to his treatment of Class II cases. Sir Norman preferred the inclined plane to reciprocal traction, because he thought that he thereby gained the advantage of muscular effort and will-power on the part of the child. The speaker wondered to what extent that was true. If an inclined plane were placed in a child's mouth—he was speaking of those "inclined planes shod with gold," of which Sir Norman had spoken with such scorn—the effect was only got during mastication, exactly as with the biting-plate. In the ordinary way a person's teeth were not clenched; they were kept apart, and he did not think an inclined plane had any action except when the child was eating. Sir Norman had spoken about bringing the jaw gradually forward. Supposing that the teeth had been brought to such a position that the child was able to bite either in the backward or forward position, he would have thought it was difficult for the child to have bitten at all in the intermediate position, and he took it that it was one of the essentials of the treatment that the arches should be brought into such a form that the child could bite in the correct forward manner, and bring his teeth together. That was a point which had been enforced very strongly by Rogers. It would be remembered that he laid very great stress on that point, that first of all the arches must be so altered that the child could bite in the correct position, and when he could do so he must bring his teeth into the right position, contracting his muscles many times forcibly, so as to make the position permanent. The speaker thought that in that way the procedure was likely to be far more effective than simply to use the inclined plane. He had used inclined planes many years ago, but he gave them up for reciprocal traction, and for this reason, that although he could alter the child's bite, he found that the child tended to resume the old position. The child could bite in either position. By using reciprocal traction, with exercises, after the arches had been got into such a shape that they could be placed together correctly, he found it much easier to obtain the result where the child could not by any means get into the old and wrong position. As to what took place in the joint or did not take place, none of them really knew, but in some cases—particularly those which he had treated some years ago—he had been fairly convinced that after a while there was no difference in the relation of the mandible to the maxilla, and the teeth either in one or both jaws adjusted themselves. Of course, one could not prove this. It was only a matter of judging from photographs; there were no exact data available; but in many cases he had felt confident that a change had taken place in the joint. If one allowed that a change could take place in the joint, it was much better to get the mandible into position and keep it there than to let it go backward or forward all day. That was why it seemed simpler to him to use reciprocal traction instead of the inclined plane, providing always that one let the child do muscular exercises to keep it there.

Mr. George Northcroft wished to add his meed of thanks for this most interesting paper. He wished to ask what terminology Sir Norman would use to describe a "general crowding." "Lack of bony development" was rather a mouthful to express what was meant, and he would be very grateful to learn of some substitute. He was at the moment wishing to describe a group of cases which he had called "general crowding," and at present there seemed to be nothing better to replace it. With reference to the biting-plate *versus* intermaxillary traction, the whole point lay in whether the lower incisors were sufficiently depressed to bring the mandible satisfactorily forward under intermaxillary traction, and whether the force of the lower incisors striking against the upper incisors in intermaxillary traction was sufficient to depress them. In those cases where it was not undoubtedly sufficient to depress them, he thought the inclined plane was good practice, but one should have enough knowledge of both techniques to use either method where it was obviously required. He always tried to be catholic

in his choice of method, and to choose the method which he thought right for the particular case in hand. He thought that Sir Norman's description of the group of conditions which had to be taken into consideration when first looking at a case was very useful and valuable. It would be a very good thing if that sentence from his paper were typed out and placed on every desk and looked over when called in to a consultation over a new case. It showed what a number of things one had to think about. Some of them were very likely to be forgotten in their enthusiasm or predilection for particular theories. They reminded one of the many pitfalls which had to be encountered. It was well to ask the parents whether there was likely to be any difficulty with the school authorities in allowing the necessary number of visits to continue the orthodontic treatment. Often treatment was complicated by reason of the fact that such inquiries had not been made beforehand. Sir Norman's paper was so straightforward that it left very little to discuss, but it was none the less valuable on that account.

Mr. HAROLD CHAPMAN said that he desired to associate himself with the congratulations to Sir Norman, but he congratulated him more on having thought of a subject which was not included in either of the two new editions of dental textbooks which had appeared during the last six months. In the index of neither of them was the word "psychology" to be found. Sir Norman had so well covered the subject of psychology that there seemed little to be said. He had put forward three aspects of this, namely, the patient, the parent and the practitioner. One point which perhaps had not been mentioned was that when the actual orthodontic operation was going on, the patient must be the centre of attention the entire time. The attention of the operator must not be allowed to wander to the parents or anybody else in the room. If, on occasions, he had allowed his attention to lapse a little he was, metaphorically speaking, hauled over the coals, and it really was a very important point that the child should be in the centre of the picture. That was very necessary for success; as soon as one relaxed one's concentration on the child, the child reacted to it immediately. He had intended to deal with the treatment of Class II cases which Mr. Badcock had raised. Perhaps an additional point had occurred to him, so that he might continue the discussion on that line for a moment. Sir Norman had not referred particularly in his paper to Divisions 1 or 2 of Class II, but it was made clear by the lantern slides which he had shown at the end that he had referred to Division 1. He himself had not been so successful with removable appliances, but perhaps that was due to his lack of appreciation of the situation and of what the patient would do for himself. It had only confirmed what several mothers had told him from time to time, that they themselves were post-normal at 12 or 14 years of age, but when they grew to be adults they had trained themselves to bite in the forward position. The cases which Sir Norman had shown confirmed the view that that was a possibility, although up to now, he was free to confess, he had had an open mind on the matter. Referring to the orthopædic principles of treatment which had been mentioned, one of the principles which the orthopædists demanded was that the improved position should be maintained all the time, and that was what he felt that Sir Norman could not obtain if plates were used, though, if intermaxillary traction were used, it could be maintained uninterruptedly. He did not quite agree with Sir Norman when he said that the volition of the patient played no part; he thought that with the use of intermaxillary force volition did play some part. He could recall the case of an apathetic patient, where intermaxillary force did considerably less good than in most cases. He told his child patients that the rubber bands were reminders to them to keep the jaw forward. They were not to let the rubber bands do all the work. In support of the argument that continuity of use was essential, he could recall a child who was wearing intermaxillary elastics for two years, and the result at the end of that time was not what he expected. He knew that in the type of case of which this was an example and the intermaxillary force was worn continuously, that at the end of twelve months there would be practically a perfect or normal occlusion, but in this case at the end of two years the results did not materialise, though in reply to inquiries he was told that the rubber bands were worn *always*. At last he discovered from the nurse that the patient never wore the elastics at night. Of course, he made indignant remonstrance, and now the rubber bands were worn all the time. But the case did seem to emphasise the fact that maintenance

of the improved or new position must be continuous. As one interested in the teaching of orthodontics, he desired to say a word about the specialist and the general practitioner. He thought there was a place for both, and that it was important that the general practitioners should have a good knowledge of orthodontics and be able to practise it. Probably the lack of interest in this subject was partly explained by the fact that in the examinations it had been allowed to take a very minor position. That was a serious matter, and it was interesting to find that in some of the newer universities which were granting degrees orthodontics played a larger part in the curriculum. The students' interest in orthodontics should be encouraged, and lectures should be compulsory. Technical work should be compulsory also, and in the examination there should be a special paper on the subject. Whether afterwards the practitioner actually treated patients could be left to his own discretion. If he was interested in the subject he would treat them ; if he was not interested, at least he would have been taught the technique and the principles of practice, and he would then be in a position to advise parents on the proper course they should adopt, whereas at the present time very frequently the general practitioner was not able to advise to the best advantage. That was a matter which was well worthy of the consideration of the examining authorities.

A Member said that he had listened with particular interest to the so-called operation of raising the bite. Sir Norman had said that after inserting a biting-plate the results varied considerably, sometimes improving almost at once, and at other times waiting for a long period before improvement was shown. He wished to know whether this did not depend upon the period at which the plate was inserted, whether preceding or immediately following an eruptive process in some other part of the mouth. Was it not better sometimes to delay putting in the biting-plate until the eruptive process was again active, or, if the plate was necessary as a splint to keep back the first permanent molars, would it not be better to add material in front of the plate until the premolars had commenced to erupt ?

Mr. H. E. Marsh said that on the all-important question of enlisting the co-operation of the difficult child and the parent, he had found it of the greatest assistance to make use of a collection of ready-made appliances, with the aid of which he could explain to the child exactly what he intended to do, and he made use of these ready-made appliances mounted on models at every stage in the construction of the appliance for the child's mouth. He had not only found this a very great aid in getting over the fear of the child, because he could explain exactly to the child the various stages of the construction, but he had found it also a very great help in enabling him to make and fit appliances much more accurately than he could before making use of that method. He thought members would agree that badly constructed appliances were a very frequent cause of want of success. They all had experienced the anchor bands which came off when the child was away, and these, in the case of a fixed appliance, led to a great deal of difficulty and probably suffering on the child's part. If one came upon a molar with a badly made amalgam filling in it, for which it was necessary to fit an anchor band, and if one had to trim the filling, the process might be painful, necessitating the use of a local anæsthetic, which was troublesome in the case of a nervous little child. If one could show the child, with the aid of a band and tooth on a model, exactly what was to be done to enable the band to be properly fitted, it would be a means of gaining his confidence and assisting not a little towards a satisfactory result. In the case of biting-plates, too, he had found it of great assistance to have a biting-plate made, finished and mounted on an articulator, so that he could explain to the child that the aim was to permit the molars and premolars to erupt further, after the lower incisors had been propped open.

Dr. E. S. Friel, after thanking Sir Norman Bennett for his paper, said that he wondered, when he got the notice of the title of the paper, whether Sir Norman was going to make a tirade against orthodontists for wrecking children's nerves during treatment. One principle of psychology which he had himself applied, and which he thought of great importance, was always to be honest with the child and never to tell a deliberate untruth. The importance of that had been brought home to him the previous week, when a lady brought a child to him for the first time. When they came into the room the mother said, " I want you to look at this child's mouth," whereupon the child made a frightful scene and said,

"But you told me you were only coming with a message to Mr. Friel." It took him a quarter of an hour to make that child quiet, after which she gave no further trouble. It was the deliberate untruth which had upset the situation. With regard to the treatment of post-normal occlusion, there was a certain amount to be said for the treatment which Sir Norman advised. Exercise should have a great deal to do with moving the jaw forward. Only a few days previously he had been speaking with Dr. De Coster of Brussels, who told him he never used intermaxillary traction for post-normal occlusion, but only muscle exercises or possibly a bite-plate. Personally he used intermaxillary traction, but he employed very weak elastics. The pressure of the elastics he did not think ever exceeded one and a half ounces each side, and they served as a reminder to the child to bring the jaw forward. Sir Norman had mentioned that he could not understand how teeth could move forward through the bone, and had said it must be a movement in the joint. But Professor Brash's work, he thought, indicated that teeth could move through the bone, and he thought it was possible that the stimulus of a weak elastic was sufficient to make the teeth want to move forward in that way. Certainly in the treatment of some of these cases, the close bite seemed to disappear as if the teeth actually were moving, and this might be due to a combination of changes in the condyle as well as actual movement of the teeth through the bone.

Mrs. Muriel Michaelis said that it was most important to enlist the help of the child. With the removable plates particularly, she had found that when one instructed the parent or nurse to keep the plate clean, one did not get anything like the success which one did if one made the child understand the importance of keeping the plate clean and undertake to do it for himself. Very often the parent or nurse forgot to do this, but the child himself, if he could really be made to co-operate, would not forget. As one small child said to her, "Mother is no good at cleaning the plate, she leaves the corners out." She was very particular about not having any parents in the surgery, even though such practice was a little unpopular. The only time she did waive her rule was in the case of a very small child of 4 who was supposed to be extremely nervous, and both the father and mother came and insisted on stopping in the surgery. Nothing, however, was done during three visits until the parents were—she feared with some rudeness—told to wait in the waiting-room, after which there was no trouble at all. If the orthodontist got the children by themselves, their interest could be better obtained. If their parents were present the child would keep looking round to see if the parents were attending. She always let the children have a book, and then, during the time occupied in soldering and other things, the child did not get fidgety. In that way, during the intervals, the child was not occupied by wondering what was the next thing one was going to do to him, and whether or not it would hurt.

Mr. H. G. Watkin said that he was glad that Sir Norman was numbered among the extractionists, and was not afraid to suggest extraction where he thought it would be an advantage. With regard to the inclined plane, it had been his practice, when giving a biting-plate, to supplement the power of mastication by means of exercises. As Mr. Badcock had said, in the ordinary way action only took place during mastication, if one had no exercises, but if there were exercises, a quicker result was obtained. He might perhaps be pardoned for saying that at the next meeting of the Society there would be shown a moving film of Rogers's exercises which he knew would be very well worth seeing. It had been shown at the recent International Orthodontic Congress. With regard to Dr. Friel and the patient who cried, he had had a similar experience. The mother had brought two children into the surgery, and when she asked that the second one might be examined, the child immediately protested and said, "You didn't say I was going to be looked at." But he himself in that case refused to do anything, because he would not let the child think that he was doing something behind his back.

Mr. Bull said that some speakers had placed the responsibility for orthodontic treatment on to the child. He knew that youth was very much to the fore in these days, but after all, it was the parent who paid the bill, and the parent who would protest if anything went wrong. Therefore, although the child should be taken

into account, he did not think that the whole of the responsibility regarding treatment should be placed upon the child and the parent left in total ignorance.

The PRESIDENT (Mr. Pitts) said that he would like to recount one little incident which illustrated the importance of getting the co-operation both of the parent and the child, without which all orthodontic cases were foredoomed to failure. Some years ago a child of 8 or 9 was brought to him—the only daughter of rather elderly parents. She had a mesial occlusion, and he decided to put a fixed appliance on the upper jaw. This was done without difficulty. A couple of days later the family doctor telephoned him and said that the child was not well and that the mother was "fussing herself to death." The family doctor knew quite well that there would be no peace until the thing was taken off. He saw the people again, and found the mother full of woe; the child, she said, was unable to eat or sleep. On looking into the mouth, he found that the tongue was heavily furred, the breath offensive, and a history of constipation of some standing. But it was obviously a case in which argument was no good, and so he removed the appliance, receiving next day a jubilant letter from the mother in the tone of, "I told you so," informing him that the child was now perfectly well.

Sir NORMAN BENNETT, in replying on the discussion, said that Mr. Badcock had agreed with him that the biting-plate operated chiefly or entirely during mastication, and that it was necessary to separate the molar teeth by only a very small amount indeed. Mr. Badcock thought the same thing happened with regard to an inclined plane, and therefore unless one made the inclined plane such as to correct the malposition in one jump, and put the teeth into normal occlusion, the child could not bite; so that the inclined plane would not do any good. Sir Norman did not think that that point was very difficult to answer. He did not believe that an inclined plane acted only during mastication. It was true that the normal position of rest was with the teeth slightly separated, but a person—adult or child—did not go about all day in that position. He was constantly shutting his teeth every time he swallowed saliva, and at all sorts of times, and if one could induce in the child's mind the idea that he had to bite forward, he would do it at all sorts of odd times, quite apart from mastication. He believed that the reason for raising the bite ever so little was that nature worked things gradually. If one separated the molars by a large space the molars themselves would, as it were, make no attempt to come together, whereas if they were separated by only a slight distance, then, in mastication, they did tend to come together. There was another point about trying to bring the jaw forward all in one leap. He believed that the condyle grew backwards. They knew that it was growing backwards in the normal process of growth. All they wanted to do was to accelerate that process a little. There again, if one made the condyle only come forward a little from its position of rest, it was more likely to keep on growing backwards a little more quickly than normally. Another point was that it was possible at any rate to do the work in two jumps, because in some cases at least, if one came half-way, one had the position of malocclusion of half a unit, which did give some masticating possibilities.

As to whether the jaw came forward or the teeth came forward, personally he could not believe that the teeth came forward in the jaw. He would admit, on anatomical or physiological grounds, that growth of bone might carry the teeth in various directions, forward as well as upward, but if the teeth came forward the result must be a labial inclination of the lower canines. If the teeth were all in contact and the molars and premolars were to be considered to have come forward in the jaw, that could only be done either by the canines coming forward as well or else by sloping forwards, and he had never noticed that the canines sloped forward after treatment of these cases any more than they had done before. Therefore he did not see how the teeth could have come forward in the jaw.

Mr. Northcroft had asked him to invent a name for general crowding. He had never succeeded in doing so yet. A name could easily enough be invented which would indicate under-development of bone, but it had to carry with it the correlative idea of the irregular position of the teeth.

With regard to the question of the inclined plane *versus* intermaxillary traction, he entirely agreed with those members who had said that each case must be treated on its merits. Undoubtedly there were some cases that came forward more easily than others, and he agreed that the intermaxillary elastics should not

be regarded entirely as passive methods of treatment. If the psychological method was taken into account, it might be regarded as a sort of reminder or stimulus to the child to bring the mandible forward of his own accord.

Mr. Chapman had asked whether he had objected to the child swallowing half the plate or half swallowing the plate. The case he had in mind was one in which he had sent a child to school with an expansion plate. The local dentist thought, quite rightly, that sufficient had happened, and so he made a retention plate which consisted of a small vulcanite appliance. Afterwards the father brought the child to him, and exhibiting the plate, said that he did not like it at all because the child had half swallowed it, and it had entailed a very disagreeable process to get it back again. That had confirmed him in his belief that no plate should be inserted in a child's mouth which was capable of being swallowed or of getting into a dangerous position at the back of the pharynx.

He did not know what he would have said to the parent who said that she wanted something for her money. He thought he would have replied that if she wanted to hear her child make funny noises, she could do so at home, without having to pay anything !

When he was talking of Class II cases he was really thinking of Division 1.

He had been interested to hear about adult patients who said that they had at a comparatively late age cured themselves. Some while ago he saw a child of 3, with a pre-normal mandibular occlusion, which he was expecting to treat, but a little later on the mother said that the child's condition had rectified itself, and, sure enough, instead of the pre-normal mandibular occlusion, the child had got a normal occlusion. The previous condition had evidently been due to habit, and the habit had been broken.

He agreed with what Mr. Chapman had said about specialists and general practitioners.

With regard to the question of raising the bite at the time when new teeth were erupting, he thought it was a great help if teeth were erupting, because the erupting teeth would go on more easily than those which were or had been in occlusion. He would much prefer, however, to do the work at an earlier age—in fact as soon as possible—because he would have every expectation of being able to cure the condition.

Dr. Friel had emphasised the great importance of being perfectly honest and straightforward with the child, and with that he agreed. He had been interested to hear the opinion of Dr. Da Costa. He felt that many of them could use muscle exercises a great deal more than they did.

Mr. Watkin had said that he (Sir Norman) had joined the extractionists, but, in fact, he had always been one of them. He had never been able to convince himself, in the cases one saw at hospital, where obviously the jaw was so small that it could not possibly hold the normal complement of teeth, that some extraction was not called for.

He agreed with Mr. Bull that, after all, the parent did come in somewhere. The parent must be allowed to have some little share in the results which one was trying to obtain, and it was desirable to explain to the parent exactly what one was doing, and the reason why one was doing it. It was by the co-operation of parents and children both, that one got the best results.

Mr. Pitts had reminded him that the second case which he had shown that evening was a boy who at an earlier age had had fixed appliances. This boy was entirely miserable with these appliances until they were taken off. Later he had learned that, with the appliances that he himself had provided, the boy was setting himself to wear the plate for so many hours the first day, and so many hours in subsequent days, and the knowledge that he could take it out enabled him to endure the discomfort. That was an interesting example of the varying attitudes of mind that were shown by different kinds of children in respect to different kinds of appliances, and bore out the necessity for choosing the one most suitable for the case in hand.

Hon. Secretary's Report, 1931.

It will be a matter of satisfaction to all members of the Society to hear that, despite the general economic stress which has obtained, the year's working has proved eminently satisfactory.

The past year has seen many changes, chief amongst which is the new location of the headquarters of the Society. Considerable anxiety was occasioned as to the suitability of the new headquarters in Portland Place, and although even now every detail in respect of our comfortable accommodation has not been satisfactorily settled, the Executive hope to effect all the necessary changes in the near future.

In this connection we should not be unmindful of the services of the late Secretary, Mr. A. L. Packham, who shouldered the main burden of the negotiations necessitated by the change over.

Adverting to the state of the membership, 26 new members have been elected; this comparing well with last year's figure of 14, and the previous year of 8.

Four members have resigned, 5 members have died, and the names of 4 have been erased for non-payment of subscriptions, so that the membership will start at 251 for the year 1932.

During the year the Second International Orthodontic Congress, of which the B.S.S.O. was a component society, was held in July, many members taking prominent parts in the demonstrations and proceedings. Dr. Friel and Mr. Pitts were the Hon. Presidents and Mr. Chapman Hon. Vice-President, whilst a noteworthy section of the Congress was the museum, the management of which was in the hands of Mr. H. C. Highton. Seven meetings were held on the usual dates, the President inaugurating the series with a most helpful address, whilst the succeeding papers and communications were of a high order.

In this connection it might not be inopportune to stress the difficulties of the programme sub-committee in their compiling of the papers and communications for the year. In no circumstances are members circularised, but it falls to the Secretary to approach all likely members by a personal letter. In some cases no replies are received to such letters, whilst most often a disinclination is expressed to perform any such function. Members should realise that the Society is not solely a social club, nor is it carried on for the benefit of a few isolated members; it is a society established for the study of our speciality, and every member should realise that it is his or her individual responsibility to offer some practical help in the matter of giving a communication or supporting a discussion. Too often diffidence and false pride prevent that easy interchange of ideas and views which is of such inestimable benefit to us all.

The programme for 1932 is now being compiled, and the Executive are very hopeful of solid support for all sections of the membership; the papers and communications are the life-blood of our continued success, and further progress must be worked for, not only by the Council and Executive, but by all the members of the Society.

The next two years are likely to be anxious and critical ones in the national life, and all members of the British Society for the Study of Orthodontics will be called upon to shoulder increased burdens of every kind. It is to be hoped that during this time interest in and support of the meetings and proceedings will never waver, and that the return of material prosperity to this country will find the Society larger and more firmly established than ever before.

Hon. Librarian's Report.

A certain number of members have availed themselves of the opportunity of borrowing books from the library during the current year.

With the exception of Bennett's "Science and Practice of Dental Surgery," no books of outstanding interest have been added to the collection.

Surplus copies of the *Transactions* have been presented to some members in order that they might complete their sets. A few copies have also been sent to foreign societies.

The existing arrangements prevent the housing of the entire library at our present headquarters, but it is hoped that this matter will be rectified in due course.

The PRESIDENT then delivered his valedictory address from the chair:—

VALEDICTORY ADDRESS.

It is the custom for the president of this Society on the termination of his year of office, to deliver a valedictory address. The cynic may here find a parallel between the latitude formerly allowed to the condemned prisoner who was permitted to address a few words, usually of contrition and repentance, to the crowd before laying his head on the block and passing into the dusty oblivion of death. My words, like theirs, will be brief, for it would be ill-fitting on my part to linger on the stage now that my brief hour of glory has passed, and to delay the induction of my successor.

During the last year we have had a full programme, and several very interesting contributions have been made. It is gratifying to note that the younger members have played so prominent a part both in the reading of papers and in the discussions. This is as it should be, for a society which cannot attract its younger members to take part in the conduct of its proceedings is doomed to gradual extinction. We are fortunate in our Society of having a large number of what in Japan, are happily called the elder statesmen. They are learned in all the lore of orthodontics and bring to our discussions a wealth of experience which all must envy and few can hope to attain. It is equally a matter for congratulation that, unlike some societies where the senior members are like the modern skittish grandmother at a ball, who monopolises all the young partners and leaves her granddaughter to play the rôle of a wallflower—our elder statesmen know when to be silent and let the younger members have their fling and when to intervene with some ripe comment which they alone can make.

Two events during the last year call for comment. One is domestic. The hospitality of the Medical Society of London, where we have met for so many years, is ours no longer. This was unavoidable, however much it may be regretted. An environment redolent of Hippocrates and Harvey has been exchanged for the more homely one of domestic hygiene.

The other event was the Second International Orthodontic Congress which took place this year. Since this country was the host it would be natural to expect that members of this Society were actively concerned in the conduct of this Congress. This was so, and a large burden of the responsibility fell on members of this Society. We are all proud that our honoured member, Mr. Badcock, was the President-General, and Mr. Northcroft, who has played so conspicuous a part in the history of this Society, was the Vice-President-General. I think it will be admitted that the Congress was a success. Without being arrogant, we may collectively take some pride in this, for it may fairly be said that the influence of this Society in fostering and stimulating an interest in orthodontics in this country, made it possible for this branch of dentistry to undertake the heavy responsibility of staging an international congress devoted to orthodontics.

When I assumed office I craved your indulgence for the faults which I might commit. I thank you sincerely for the kindly way you have received my efforts to preside at your meetings. Like Moses, my feeble arms have been upheld by Aaron, the Treasurer, on one hand, and Hur, the Secretary, on the other. To them and to the members of the Council I offer my sincerest thanks.

Once again I thank you, and I assure you that I shall always cherish with pride the fact that I was once thought worthy of serving this Society in the capacity of president.

At the close of his address, Mr. PITTS invested his successor, Mr. Carl Schelling with the badge of office. Addressing Mr. Schelling, he said : " You have served this Society in the capacity of Editor for a great number of years. In that capacity it has been your task to make what we have said at these meetings suitable for publication. You have filed and sandpapered our rough sentences. You have many friends in this Society, and I will venture to say that no one has ever been heard to say an unkind word about you. I trust that you will have a year of office that will be a happy one, and I know that from the Society's point of view it will be a successful one. If you can manage the affairs of the Society with the same skill as, rumour has it, you can cast a fly over the feeding trout, then I congratulate you." (Applause.)

Mr. Carl Schelling then took the chair.

Mr. A. L. Packham proposed a vote of thanks to the retiring President, Mr. Pitts, for the very able manner in which he had served the Society during the past year. He said that the Society had always been extremely well served by its presidents, and Mr. Pitts had been no exception to the rule. He did not think that members realised what a president of the Society had to do, and Mr. Pitts's year of office had been particularly onerous. He had spoken in his valedictory address of the Second International Orthodontic Congress, but he had not told the members of the work which he himself had done towards making that Congress the success that it undoubtedly was. As representative of the Society he attended every meeting of the Governing Body of the Congress, and he had to take decisions on the Society's behalf affecting its welfare. The speaker asked his fellow-members to join in this vote of thanks with acclamation.

The vote of thanks having been given with great cordiality, Mr. Pitts, in reply, said that it had been a very great pleasure to have served the Society, and he felt that the vote of thanks which had been accorded to himself should be extended to cover the other officers who were retiring. He would take the liberty of regarding the vote of thanks as pertaining to the retiring Treasurer, Mr. Visick, as well as to himself. He also, on behalf of the members, expressed their thanks to Sir Norman Bennett for his paper that evening.

The proceedings then terminated.

Hon. Treasurer's Report.

During the past year the Society's income has been £233 12*s*., which is about £11 less than the previous year. This sum is chiefly from members' subscriptions. The expenditure has been £154 7*s*. 7*d*., as compared with £142 17*s*. the previous year. This leaves a credit balance of £79 4*s*. 5*d*.

You will remember that £200 had been placed on deposit to cover our grant of £200 to the International Orthodontic Congress. We were able to pay this sum to the Congress by drawing £125 only from deposit, the balance of £75 being taken from the General Fund.

There is therefore a sum of £75 on deposit, and I recommend that this sum should be invested.

The Society's assets are: Prize Fund, 500 National Savings Certificates at a present value of £475 ; cash on deposit, £75 ; cash at bank and in hand, £17 9*s*. 3½*d*., making a total of £567 9*s*. 3½*d*., as against £677 6*s*. last year.

Hubert S. Visick.

27*th November*, 1931.

BRITISH SOCIETY FOR THE STUDY OF ORTHODONTICS.

INCOME AND EXPENDITURE ACCOUNT, December 1st 1930 to November 30th, 1931.

STATEMENT OF ACCOUNTS.

1929–1930. £ s. d.	Receipts.	1930–1931. £ s. d.
239 8 0	To Members' Subscriptions	230 19 1
0 18 11	,, Sale of *Transactions*	1 1 0
1 15 4	,, Deposit Interest	1 11 11
2 2 0	,, Sundry Credits	—
£244 4 3		£233 12 0
—	,, Transferred from Deposit	125 0 0
£244 4 3		£358 12 0

1929–1930. £ s. d.	Payments.	1930–1931. £ s. d.
25 0 0	By Rent	18 16 0
62 1 8	,, Printing and *Transactions*	58 10 5
18 18 0	,, Reporting	18 18 0
2 2 0	,, Refunded Subscriptions	3 3 0
—	,, Register	4 4 0
15 8 0	,, Honoraria	5 5 0
—	,, Removals	3 0 0
14 9 0	,, Refreshments	21 5 0
—	,, Hire of Epidiascope	6 6 0
4 10 0	,, Petty Cash	15 0 0
0 8 4	,, Bank Debits	0 0 2
£142 17 0		£154 7 7
100 0 0	,, Transfer to Reserve	—
—	,, Grant to Orthodontic Congress ...	200 0 0
£242 17 0		£354 7 7
1 7 3	,, Balance	4 4 5
£244 4 3		£358 12 0

Assets.	£ s. d.
500 National Savings Certificates, value	475 0 0
Deposit	75 0 0
Cash at Bank	13 2 3
Cash in Hand—Secretary £3 0 1	
Treasurer 1 6 11½	
	4 7 0½
	£567 9 3½

We have examined the Books and Vouchers and find the above Statement of Accounts to be correct.